PACKAGE engineering

Materials and techniques of candy packaging

A research expert's analysis of the selection and use of coatings, individual wrappers, overwraps and box liners — to protect the inherently delicate candy from moisture, flavor and temperature changes. (See Page 9)

New concepts in food and container research

Reviewing the progress in radiation preservation of food, dehydration, and aerial delivery — all of which is the subject of much pioneering study at the Quartermaster Food and Container Institute for the Armed Forces. (See Page 14)

Developing and using labels in rolls

Combining the use of new equipment and methods to attain roll labeling — to get its economies and advantages without losing the accuracy and control necessary to assure precise labeling of specific products. (See Page 16)

Complete table of contents on page 2

MAY 1956

VOLUME 1 • NUMBER 5

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Aluminum Foil Packaging as a Gas Barrier

Report No. 3 of a Series by Reynolds Metals Company

The impermeability of aluminum foil to gases serves a twofold purpose in protective packaging. First, the foil serves to exclude deleterious gases such as oxygen as well as odoriferous organic vapors. Second, the foil serves to retain protective inert gases such as nitrogen and carbon dioxide. To achieve these purposes, it is necessary to convert this impermeable aluminum foil into a usable gasproof package, sealed in a way that prevents gas transmission through the sealed areas.

Activated dried yeast is an excellent example of a product requiring gasproof packaging. In the presence of oxygen, this product deteriorates rapidly; yeast spores gradually die off, reducing their effectiveness as the leavening agent to a point where doughs will not rise at all. Unless protected against oxygen, activated yeast cannot survive any practical time lapse between packaging and use.

This packaging problem was solved by the Reynolds Research and Development Laboratory by gas packaging the yeast in a heat-sealed envelope consisting of a lamination of aluminum foil, paper, and Pliofilm*. This package, formed from a continuous web on automatic package forming and filling equipment, maintains an inert nitrogen atmosphere for many months. Of most importance, however, is the fact that this package containing the inert gas extends the shelf life of activated dried yeast many months.

This is only one demonstration of the gasproof property of aluminum foil and how it is used in packaging. Packages have been developed by Reynolds to hold 29 inches of vacuum for periods of time well over one year. The degree of impermeability achieved in a foil package is limited only by the particular product's requirements.

Reynolds Research facilities and experience in controlling gas transmission may be made available for your particular packaging problems by contacting your nearest Reynolds regional representative—or write to:
Reynolds Metals Company, General Sales Office, Louisville 1, Ky.

Rolls (before and after baking) prepared with activated dried yeast packaged in sealed aluminum foil envelopes and stored at a high temperature and high humidity for one month. *Pans at Left:* rolls made with yeast packaged in foil envelopes in which atmospheric oxygen was replaced with inert nitrogen. *Pans at Right:* rolls made with yeast packaged in foil envelopes containing normal atmospheric oxygen.

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*Goodyear trade-mark for its rubber hydrochloride

Coming next month

Far too often, in the development of a new product, the packaging man is not called into the discussion until after the product is ready for packaging. In contrast to this unhappy situation, the opposite concept prevails at Minneapolis-Honeywell Regulator Company. Our next issue will have an article by Peter Henningsen, packaging engineer of this company's aeronautical division. In this article, Mr. Henningsen explains the structural and functional place of packaging in his organization, and tells how package engineering proceeds hand in hand with product engineering—from the paper stage to actual production. He cites examples of engineering and testing in a field where new products appear with amazing rapidity — due to the constantly changing character of aircraft components.

The task of measuring a corrugated box is not as simple as it appears at first glance. Varying approaches and controversial opinions cloud the issue. To contribute to the clarification of the problem, we are featuring an article by M. J. Harnist, veteran packaging specifications expert of the Brooklyn plant of E. R. Squibb & Sons Division of Olin Mathieson Chemical Corporation. One of his major points is the method of measuring "from center-to-center of scores" rather than by inside dimensions. While he recognizes the controversial nature of his recommendations, Mr. Harnist advocates the superiority of the "center-to-center of scores" concept.

Also, our next issue will carry an interpretative summary of the recent American Management Association National Packaging Conference, with attention to features of special interest to those engaged in the technical and operational phases of packaging.

— R. B. H.

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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Here are the results of a ten-year study of candy packaging, with particular attention to coating, individual wrappers, overwraps and box liners—emphasizing the problem resulting from the delicate nature of candy.

14 **Research explores new concepts in Quartermaster packaging**
A review of the latest developments at the Quartermaster Food and Container Institute for the Armed Forces—with emphasis on radiation preservation, dehydration, and aerial delivery.

16 **Roll labeling in the ethical drug field,** by E. R. Hamm, production manager, Sharp & Dohme Division of Merck & Company, Inc.
By working out methods and equipment for handling labels in roll form, this company gets economies in production and reductions of inventories—without losing the high degree of accuracy and control necessary in pharmaceutical packaging.

24 **Battery acid packaging requires unique machinery, new packaging line methods**
When Globe-Union Inc. undertook production of dry-charge batteries (with the acid in separate containers accompanying battery cases) it had to develop new filling machinery and new packaging methods.

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Instead of using a packaging committee as such, Bell & Howell Company assigns just one person as coordinator of each packaging project, and he works out and follows through the details involving different departments within the company.

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A note from the Publisher

In discussing some of our editorial objectives in this column in January, I mentioned our hope was to help reduce waste in the packaging operation and to increase the efficiency of the packaging function.

While modernization of packaging equipment is one obvious method of accomplishing this, there is another area that offers some real possibilities. This is in writing packaging specifications which both buyer and supplier understand, and then adhering to them.

Recently, in talking to the production manager of a large proprietary drug house, he told me of an experience they had had, in which a supplier had changed a material specification without letting them know about it. This particular plant had a daily output of 1,000,000 units. Almost overnight, production dropped 20 per cent, and for no visible reason. Apparently nothing had been changed, but after a considerable amount of detective work, it was determined that the drop in production coincided with the arrival of a new shipment of labels. Further investigation proved that the supplier had not printed the labels on the specified material. The substituted material was rougher, and the increased friction in the labeler was slowing down production. Twenty million labels were returned to the supplier, and with the return to the stock originally specified, production went back to its normal output. However, until the trouble was located, the manufacturer had a substantially higher labor cost — not to mention the cost to the supplier who had 20,000,000 labels rejected.

Another example I ran into recently was in a company packaging a granular product which is put into small bags, and these, in turn, into large bags. The plant manager said that they periodically ran into trouble in palletizing these master sacks because they slipped off the piles. Here the problem appeared to be changes being made in the outer ply — from the rough finish specified to a smooth finish. This happened to be in a branch plant, and they had been unable to get the problem corrected because of lack of good communications between the plant and the home office. This particular problem sometimes occurs because the supplier, in his desire to give a good-appearing bag, will substitute an outer ply with a smooth finish to get better printing reproduction. This practice, besides fouling up a production line, has the added hazard of an employee's being injured if a bag should slip off a pallet.

These are two examples of changes in specifications that were costly — both to supplier and buyer. Much time and trouble could be saved by setting up packaging specifications that everyone understands, and then not changing them without talking to the men responsible for the operation of the packaging line.

Angus J. Ray
Publisher

PACKAGE engineering

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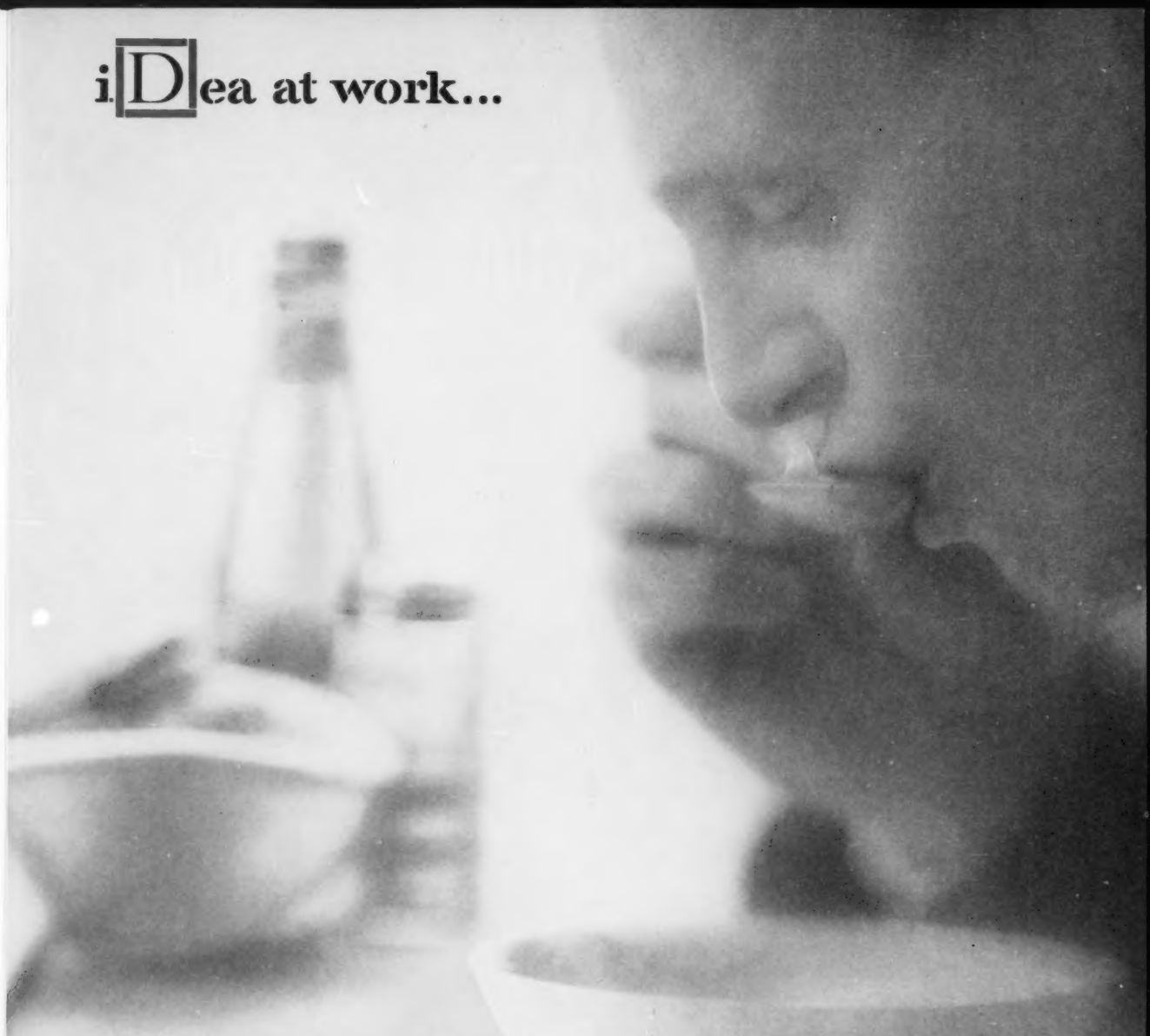

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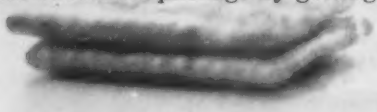

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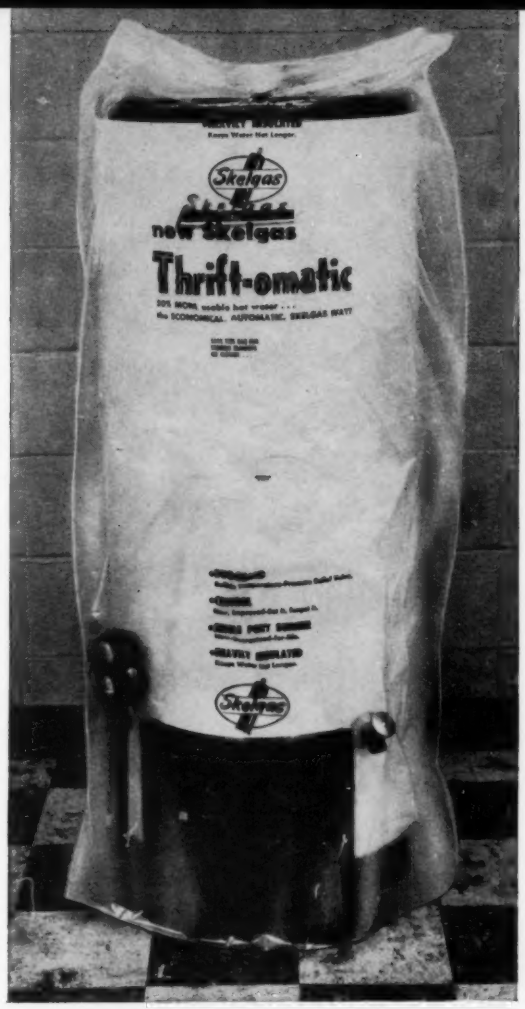

Giant polyethylene "Showbag" made by Central States Paper and Bag Company, St. Louis, Mo., protects Skelgas Water Heaters from dust, handling, and damage to the finish.

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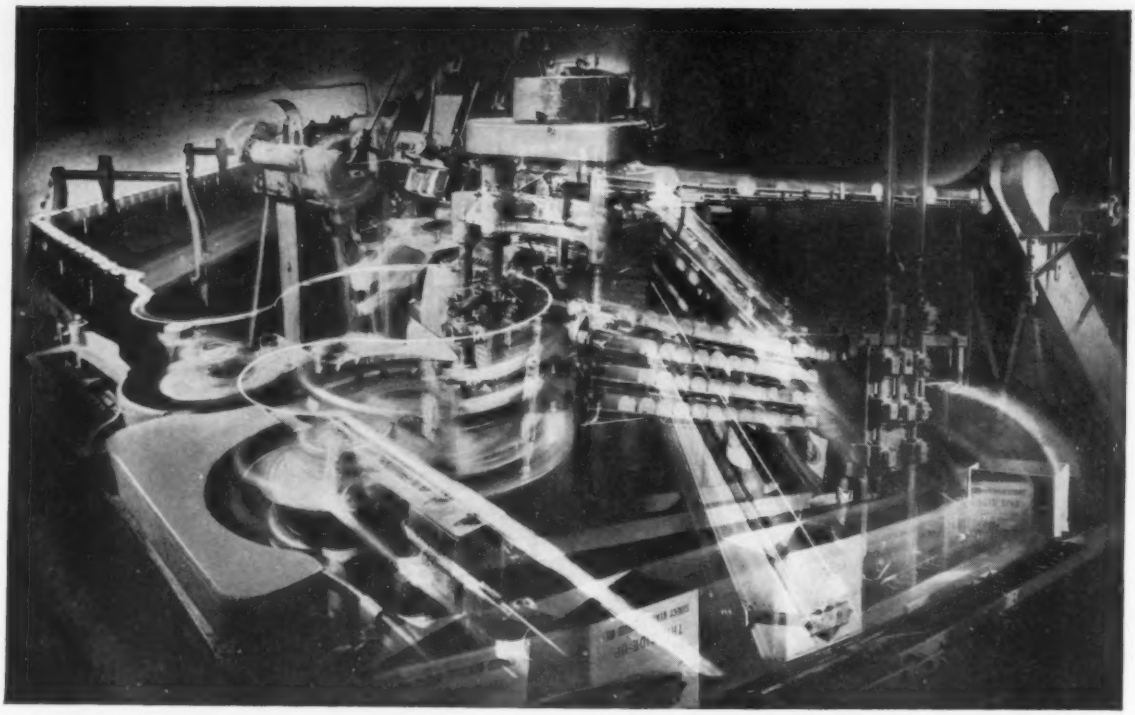

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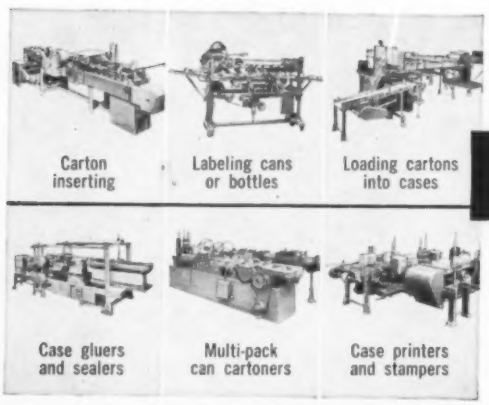

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Here is an expert discussion of the experience of ten years in the specialized problems of packaging candies. In this article, Dr. Woodroof not only tells how coatings, individual wrappers, overwraps and box liners contribute to protection against moisture, flavor and sudden temperature changes, oxidation and the like, but also reviews applications of packaging materials.

Protective packaging of candies

By J. G. Woodroof,
Chairman, Food Processing Division, University of Georgia, Georgia Experiment Station, Experiment, Georgia

Jasper Guy Woodroof received B. S. A. and M. S. A. degrees from the University of Georgia. He took graduate work at the University of California and received a Ph. D. degree from Michigan State College (now Michigan State University). Since 1922 most of his work has entailed the conducting and directing of research. He did much pioneering work on frozen foods, especially in preparation, rate of freezing, and packaging, and has published more than 50 technical reports in this field. He has prepared ten reports on the packaging and storage of candies, on which he has worked six years. Dr. Woodroof's association activities include Institute of Food Technologists, American Society of Refrigerating Engineers, American Society for the Advance of Science, and others.

Packages for candies serve many purposes, one of the most important of which is to protect the candy. The amount of protection needed varies with the kind of candy, the moisture content, the fat content, the amount of handling expected, the environment during storage, and the expected time between manufacture and consumption.

A well-manufactured piece of candy is an extremely delicate food item. It has a definite amount of sugars, moisture, fat, colors, and other ingredients — blended so as to produce a desired aroma, structure, texture and appearance. Each of these qualities must be protected individually and collectively until the piece of candy is placed in the mouth of the consumer. The fact that a box of assorted candies may contain from one to three dozen kinds increases the problem of protecting the candies from one another as well as from conditions outside the box.

It is estimated that 25 per cent of all candies spend some time in storage. This figure is much higher for assorted boxed candies, and the trend is for it to become even higher under present manufacturing conditions. Therefore, this discussion of protective packaging assumes that the candies will be stored for a period.

Due to the advantages, and almost necessity, of refrigeration in storing candies, it is expected that some refrigeration will be used. Other than for frozen candies, packaging is the same for refrigerated and non-refrigerated candies. A few candies crack on being frozen, and this defect cannot be corrected by packaging.

For the last ten years the Georgia Experiment Station has conducted experiments continuously on protective packaging and storage of candies. Some of the experiments have included 50 or more kinds of candies, and have extended for as long as two years. Others have included as few as three kinds, stored for only two months.

Storage conditions have varied with temperatures ranging from −20 degrees to 100 degrees F, and relative humidities ranging from 30 per

cent to 100 per cent. Packages included glass jars, tin cans, rigid boxes of several kinds and construction, and flexible packages of several descriptions. For controls, some candies were stored unpackaged or in coarsely woven wire baskets.

Evaluation of the packages or storage conditions was in terms of their effect on the stability of flavor, texture, color, aroma and finish of the candies. In most cases an effort was made to estimate the salability of the candies by rating the respective qualities from ten (excellent) to one (very poor). Those receiving a rating of four and a half or lower on any quality were considered unsalable.

Dr. Woodroof notes that E. K. Heaton, Barbara Cowan and Ethyl Shelor collected much of the data on which this article is based, and that members of the National Confectioners Association and The Refrigeration Research Foundation provided most of the candies and testing facilities.

How Packages Protect

One of the purposes of packaging candies is to retain, in so far as possible the fine qualities they have when manufactured. To accomplish this the packages must do the following:

PROTECT FROM MOISTURE CHANGE. Possibly, the biggest problem in holding candies is maintaining their proper moisture content. This was found to be solved best by proper packaging. Candies are made with a fairly definite moisture content, and many of the most desirable qualities are lost when deviations from it occur.

Loss of moisture may occur in all except hard candies, but it was found most likely to occur in high-moisture candies such as marshmallows, fudge, caramels, starch jellies, cordial fruits, divinity and soft creams. The results were loss of weight, graining, hardening, collapsing or cracking. On the other hand, low-moisture candies, or those high in reducing sugars, such as hard candies, taffy, hard creams, and panned candies, were likely to absorb moisture, causing them to become soft, sticky, or runny.

PROTECT FROM FLAVOR CHANGE. Experiments showed that retention of flavor in candies depended mainly upon temperatures shown in Figure 5, but the manner of packaging controlled the flavors in three ways:

(a) By retention of volatile flavors.

(b) By prevention of transfer of flavors from one piece to another in the same package.

(c) By prevention of absorption of outside flavors.

Loss of flavor occurred in most fruit and nut candies, and the more delicate the flavor the more readily the loss was detected. Transfer of flavors was noticeable when strong-flavored candies, such as peppermint, were placed close to candies high in fat, such as those with nuts, butter, or cream. Absorption of foreign flavors occurred when high-fat candies were held in an atmosphere with pronounced odors. It is highly desirable that candies be stored in a room separate from other products, and that the room be free of objectionable odors.

PROTECT FROM OXIDATION. Oxidation manifested itself mainly in causing the fats to become stale or rancid, but it also caused fruits to darken and taste like caramel — and caused nuts to darken and lose flavor. Protective packaging to retard oxidation is in need of further research, but a few facts are now known. It appears that the shelf-life of high-fat candies could be extended considerably by:

(a) Packaging so as to reduce the amount of space in the package actually occupied by candy.

(b) The use of vacuum packages such as cans, jars or film bags.

(c) Impregnating papers that touch the candy (cups, liners and dividers) with an antioxidant such as BHA (butylated hydroxyanisole), or BHT (butylated hydroxytoluene).

TABLE 1. Description and Effectiveness of Packaging Materials for Candies, Listed in Order of Preference as Moisture Barriers, When Used or Wrapping Pieces of Candy Individually, or for Inner-Lining or Overwrapping Boxes.

Description	Barriers to transfer of			Ease of application	Sealability	Durability during handling
	Moisture*	Flavor*	Fat***			
Aluminum foil, 0.0015 gauge	Excellent	Excellent	Excellent	Excellent	None	Poor
Aluminum foil, 0.0005 gauge laminated to polyethylene, 0.001 gauge	Excellent	Excellent	Excellent	Excellent	Good	Fair
Aluminum foil, 0.001 gauge laminated to polyethylene, 0.001 gauge	Excellent	Excellent	Excellent	Excellent	Good	Fair
Aluminum foil, 0.001 gauge, heat seal coated	Excellent	Excellent	Excellent	Excellent	Good	Fair
Polyvinylidene chloride film 517, 75 gauge, (Saran)	Excellent	Excellent	Excellent	Fair	Good	Fair to good
Rubber hydrochloride film, 120 H.P., 0.001 gauge (Pliofilm)	Very good	Very good	Excellent	Good	Excellent	Excellent
Cellophane, MSB-3, 450 gauge	Very good	Good	Excellent	Good	Excellent	Fair
Polyethylene, 0.002 gauge	Good	Good	Very good	Good	Excellent	Excellent
Aluminum foil, gauge 0.00035 laminated to tissue	Good	Good	Very good	Fair	None	Good
White Kraft paper, 42-pounds, coated with 8-pounds polyethylene	Good	Fair	Good	Fair	Good	Good
White Kraft paper laminated to glassine, finished weight about 78 pounds	Fair	Good	Good	Poor	None	Very good
White Kraft paper, 40-pounds, waxed one side	Fair	Fair	Fair	Fair	Fair	Good
Glassine, #500	Poor	Poor	Good	Fair	None	Fair

*Weighed periodically. **Scored by taste panel. ***TAPPI method, T454 m-44 (modified).

PROTECT FROM HIGH TEMPERATURES AND SUDDEN CHANGES IN TEMPERATURE. This was found particularly important during transportation and handling, since it was usually at this time that conditions occurred that caused fat-bloom (graying or whitening of candies due to partial melting of the chocolate coating) and sugar-bloom (formation of sugar crystals on the surface resulting from dampness, as shown in Figure 4) of chocolate candies.

Protective packaging includes some materials for insulation against brief exposure to temperatures above 85 degrees F, and for providing moisture-absorbing materials close to the candy which functions when the candy is moved from a cold to a warmer room. This is to prevent sweating (moisture condensation on the candies) and resulting sugar-bloom or stickiness.

PROTECT FROM DUST, BACTERIA, MOLD SPORES AND RODENTS. This applies mostly to bulk or loosely packaged candies held in common storage or in retail outlets without refrigeration.

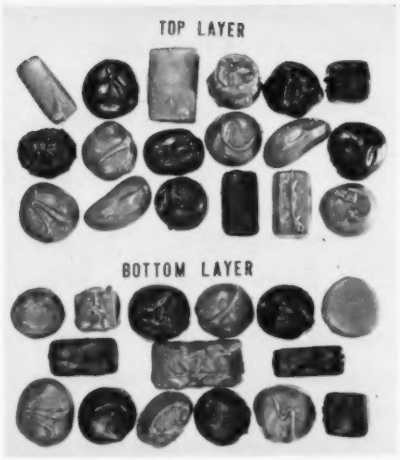
PROTECT FROM CRUSHING, SCARRING OR OTHERWISE MARRING THE ORIGINAL FINISH. This was best accomplished when each piece of candy was individually wrapped. Individual cups or a carton with dividers between each piece were also good.

Packages Need Barriers

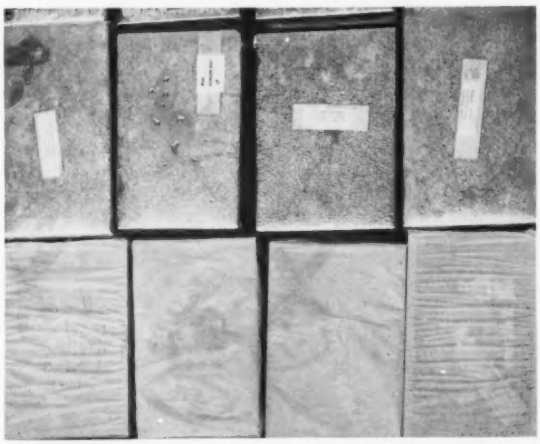
Protective packaging of candies consists essentially of providing one or more barriers (Figure 3), the nature of which depends upon the type of candy and kind of protection needed. Beginning with an individual piece of candy the following may serve as protective barriers.

COATINGS. There are four types of coatings—chocolate, crystalized, fondant, and hard butter or "summer"—all of which protect the centers, to some extent, from mechanical injury, oxidation, drying, migration of fats and loss of flavors.

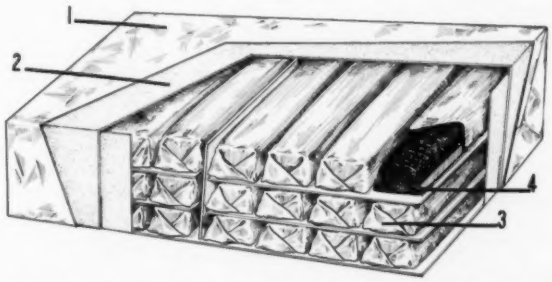
Experiments have shown that, at 50 degrees F and 50 per cent relative humidity, chocolate-coated peanut roll bars had no change in flavor in 130 days. Uncoated peanut roll bars, held



1. Arrangement of pieces of assorted chocolate candies immediately after being manufactured, for study with all of package removed.



2. Boxes of candy removed from refrigerated storage in such a manner as to cause heavy condensation. Upper: Boxes overwrapped with tissue permeable to moisture caused condensation to appear on the candy and subsequently, sugar-bloom. Lower: Boxes wrapped and sealed in moisture-resistant aluminum foil which fully protected the candy from condensation and sugar-bloom.



3. The four barriers used in protective packaging of candies: (1) a moisture-proof overwrap for the box; (2) a moisture-proof liner for the box; (3) a flexible moisture-proof, individual wrapper for the bars or pieces; and (4) suitable coating for each piece.

under the same conditions, were unsalable in 50 days due to softness of the centers and change in flavor of the nuts. But at 32 degrees F the storage life of each kind was about doubled. Sugar (coconut) bonbons were among the easiest candies to keep at 50 degrees F, remaining in excellent condition for more than 130 days. Uncoated coconut patties dried out and lost flavor in 30 days. Pan (crystalized) coated peanuts remained good for many months, while glazed peanuts lost flavor much more rapidly due to cracks in the coating.

Heavy coatings were of more protection than light coatings, as shown by loss of quality of soft centers when coatings had cracks, holes or thin areas. Refrigeration tended to minimize the ill effects of an imperfect coating or no coating at all.

INDIVIDUAL WRAPPERS. Many kinds of assorted boxed candies, candy bars and semi-bulk candies are individually wrapped to good advantage. These include taffy kisses, cut caramels, fudge blocks, chocolate coated pieces of a wide description and most candy bars.

Experiments in wrapping every other piece of candy in boxes (Figure 1), with 13 different materials as listed in Table 1, have shown individual wrapping to be the most effective means of protecting candies. Individual wrapping provided a cushion against crushing or scarring; prevented fat bloom and sugar bloom under rather severe conditions; practically eliminated loss or gain of moisture, oxidation, or migration of fats, and protected candies against insects and other unsanitary conditions.

Individual wrappers protected candies where protection was generally needed most — on the surface of the pieces. The amount of protection was in proportion to the effectiveness of the material as a barrier and to the snugness of application. Sealing or gluing was not necessary when the wrapper fitted closely without air spaces between the wrapper and candy.

Individual wrapping with aluminum foil, cellophane, saran or similar material, was especially advantageous in:

(a) Preventing uncoated caramels and fudge blocks from drying.

(b) Preventing the flavor of peppermint and other strong flavors of candies from being taken up by those containing nuts or other fats.

(c) Reducing fat-bloom on chocolate-coated candies temporarily exposed to temperatures above 85 degrees.

(d) Preventing sugar-bloom on candies exposed to dampness for a short time.

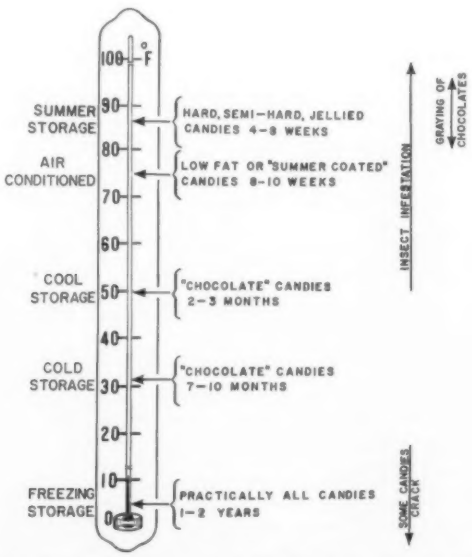
(e) Preventing candies high in invert sugar, as taffy kisses, from becoming sticky.

LINERS FOR BOXES. Experiments with lining boxes with the materials listed in Table 1, so that the sheet surrounded the candy and double folded over the top, was of some protection to the candies that were not individually wrapped. The protection thus afforded was far less than that provided by wrapping the individual pieces.

The overall benefits from inner-lining boxes were limited by (a) lack of sealing of the edges of the liners so as to form complete water vapor barriers, (b) lack of actual contact with the candies, and (c) condensation which collected on the liner and was absorbed by the box, thus tending to weaken it.

OVERWRAPPERS FOR BOXES. As was the case with inner-liners for boxes, using the 13 materials listed in Table 1, and shown in Figure 2, overwraps were beneficial only to the candies that were not individually wrapped.

4. Piece of chocolate candy marred by sugar-bloom, which can be controlled by protective packaging.



5. Chart showing the temperature of five storage conditions for candies and the expected shelf-life of candies at each temperature when properly packaged.

In one experiment, in which similar boxes of assorted candies were wrapped and unwrapped, stored for seven months at 33, 45 and 65 degrees, and "conditioned" by raising the temperature to 70 degrees by weekly intervals of 15 to 20 degrees each, there was no difference in candies that were wrapped and unwrapped.

In numerous other experiments in which boxes of candies were removed directly from 0, 33 and 45 degrees F, to 70 and 75 per cent relative humidity, there was severe condensation and sugar-bloom on candies in the boxes that were not wrapped, as well as in boxes that were wrapped with materials that were semi-permeable to moisture. Boxes of candy wrapped in materials that were "excellent" moisture-barriers had no moisture condensation, either on the boxes or candies, when removed directly from 0 degrees to 75 degrees with 95 per cent relative humidity. When "very good", "good" or "fair" materials were used there was progressively more moisture condensation on the candy.

From these experiments it may be concluded that condensation and sugar-bloom may be controlled by overwrapping boxes of candy with water vaporproof material before being refrigerated, and by allowing them to reach room temperature before being opened.

PAPER CUPS, LINERS, DIVIDERS AND PADS. These were components of the package for boxed candies and were usually made of glassine, untreated board, or tissue. Experiments have shown that these materials served many useful purposes in packaging candies, in that they acted as cushions, prevented the pieces from rubbing together, insulated the candy from sudden changes in temperature, and stabilized the moisture.

Protection from fat-bloom by these materials was indicated by the fact that pieces of candy that protruded above the edges of the cups bloomed much worse than those that did not; that pieces along the edges, and in the corners, of the box were worse than those near the center; and pieces on the top layer were more severely fat-bloomed than those on the bottom layer.

Most of these materials have proven to be poor barriers to moisture, fats, flavors and oxygen.

Summary

Candy is a delicate food item with carefully controlled moisture, fat, sugars and other solids; compounded so as to produce a specific texture, structure, aroma and flavor. Adequate packaging is the best way to protect candies from moisture change, flavor change, oxidation, and sudden temperature change, as well as from dust, scarring, crushing and insects.

Protective packaging provides one or more barriers in the form of candy coatings, individual wrappers for candies, liners and overwraps for candy boxes, as well as pads, dividers and liners for the boxes. The four most important of these, listed in order are: Coatings, individual wrappers, overwraps for boxes, and box liners.

Of 13 flexible materials studied for wrapping individual pieces or boxes, aluminum foil laminated to polyethylene was most desirable, with several others being listed as excellent.

Comparison of Materials

To determine the relative amount of protection provided by the various types of packaging materials, listed in Table 1, similar candies were (a) individually wrapped, and packed in boxes that were (b) lined, and (c) overwrapped, with 13 different flexible materials. Similar candies were left unwrapped in boxes without liners or overwraps. All of the candies were held at 33, 50 and 70 degrees F for three months, then examined. The materials were evaluated and rated on six qualities, as shown in Table 1.

In general those that were most resistant to transfer of moisture were also good flavor and fat barriers. In most cases a single material as aluminum foil, polyethylene, cellophane, or glassine had individual qualities ranging from excellent to poor, and the weaknesses were overcome when two or more of the materials were laminated together.

The durability during handling of aluminum foil was improved by laminating it with polyethylene, and that of glassine was improved by laminating it with kraft paper.

The requirements of materials for individual wrapping candies and for lining or overwrapping boxes were similar in some respects but differed considerably. For individual wrapping of candies and for lining of boxes the qualities desired were ease of application and protection against transfer of moisture, flavor and fats. For overwrapping boxes the qualities desired were ease of application, heat or pressure sealability, durability during handling, and moisture resistance.

As new materials are developed and wider applications are made of existing ones, protective packaging of candies may be expected to be improved.

Research explores new concepts in Quartermaster packaging

To meet the expected needs of any future combat operations, the QM Food and Container Institute is deep in research in areas such as radiation preservation, dehydration, and aerial delivery. As its scientists and engineers explore these new ideas and new applications, they are doing much basic and pioneering study. Their results will affect both civilian and military packaging.

Radiation preservation of food, increased emphasis on dehydration, new techniques for aerial delivery of supplies — these are among the major objectives of current research efforts of the Quartermaster Food and Container Institute for the Armed Forces. At a recent open house marking the Institute's first decade of service, those directing its military and technical activities reviewed its progress and outlined some future trends in military packaging.

Located in Chicago, the Institute is an army unit, a part of the Quartermaster Research and Development Command, but it serves all branches of the armed forces. Its military staff includes officers and enlisted men not only with technical qualifications but also with backgrounds of combat and operational experience. It also has a staff of civilian scientists, technologists and engineers, working in its food laboratories and container laboratories.

But much of its help comes from some 46 industry advisory committees whose members include over 300 industrial and technical specialists from food packers and processors, container manufacturers and other industrial organizations concerned with Quartermaster developments. Using these groups the Institute has a three-way approach to technical problems, i. e., a combination of military, scientific and industrial or commercial viewpoints.

New Concepts Develop

Fast-moving changes in military methods and operations give an urgency to much of today's research in packaging, in order that the combat forces may operate with efficiency — whenever and wherever necessary. Reduced to essentials, the main idea is that in a typical military operation of today or tomorrow the combat troops will be scattered or dispersed through a relatively large area or along a mobile front. There will be a minimum of the service and supply troop activities traditionally typical of military operations of the past.

Viewing the problem from a packaging standpoint, it all means that improved methods of preservation are necessary — to replace refrigeration facilities that will be unavailable, and to make possible much longer storage of food items without refrigeration. This emphasizes the interest of the armed services in radiation preservation. Likewise, the need of minimum weight packages to meet the needs of highly mobile fighting forces underlies the current interest in dehydration methods.

And to get food and equipment to the man on the front line (which is no line at all, but a fast-moving sequence of changes of position) aerial delivery will be the principal method of supply. This places a premium on development of energy absorbers—better cushioning materials to withstand the shock of airdrop without damage to supplies.

Radiation Developments

Many problems have to be solved before radiation preservation of foods gets out of the experimental stage. A basic difficulty is that not enough is known about the mechanism responsible for loss of acceptability, according to Capt. Reuben Pomerantz, the Institute's radiation sterilization officer. He explained that sterilizing dosages of radiation induce subtle biochemical changes in the foods, resulting in alterations of color, odor, flavor or texture.

Before control methods to prevent these changes (which in turn impair the acceptability of the sterilized food) can be developed, the mechanism responsible for changes must be understood. In this connection Captain Pomerantz noted the difference between the high sterilization levels of irradiation and the relatively low dosages used with radiopasteurization treatment. This may be given to many foods without altering their acceptability.

Aside from the basic problems of using nuclear energy instead of heat to destroy the microorganisms which promote food decomposition and spoilage, much supplemental research remains. Captain Pomerantz pointed out that studies are now under way with the cooperation of the Office of the Surgeon General and the Food and Drug Administration to determine that irradiated foods are safe and wholesome when fed in large amounts over long periods of time.

Even with these difficulties disposed of, the process of using ionizing radiation must be shown to be economically feasible and commercially competitive with current methods of food processing, the captain observed. While cost estimates are quite hypothetical, the consensus suggests that sterilization costs range between a fraction of one cent and ten cents a pound. Thus with all factors considered, including the suc-

cessful consummation of animal feeding studies on which further developments are predicated, he predicted that practical usage of radiation sterilization is at least two years away—and he warned that even this estimate is subject to variation in either direction.

Using Dehydrated Foods

While both military and civilian applications of irradiation capture the imagination of food processors and packagers, there is another area of packaging interest — offering immediate as well as long term possibilities to the armed services: Dehydrated foods. Three reasons for their use include these:

1. Reductions of space as much as ten per cent and reduction of weight as much as 50 to 90 per cent.

2. Such meals can be easily prepared by untrained personnel in the field.

3. Use of dehydrated foods provide the fighting forces meals that look and taste like food available at home.

Because canned rations offer many limitations, and because radiation is still in the research stage, dehydration presently offers the best combination of "promise and practicality" as a means of providing foods preserved without refrigeration, according to Virgil O. Wodicka, associate director for development and applications engineering, of the Institute's food laboratories. However, many problems remain, such as the expansion of the list of items dehydrated—to put more variety into meals using these foods.

Reviewing the progress of dehydrating specific food items, Mr. Wodicka noted that the greatest advance in dehydration since the war has been on meat. Perhaps the most stubborn problem is that of dried whole milk. Although improved since World War II, the resulting product is still far from the equivalent of fresh fluid milk in the judgment of the soldier. In general, however, the results of research on dehydrated foods are now showing: Increasing numbers of such foods are going into the supply system in regular production rather than in experimental quantities, he said.

Now, a typical meal of dehydrated products may start with orange, grapefruit or tomato juice; a choice of three or four kinds of soup; a main course of beans with frankfurters in tomato sauce, chicken and rice, chicken stew, turkey a la king, meat and noodles with tomato sauce, and others; coffee, tea or cocoa; mashed or sweet potatoes, carrots, green beans, sweet corn or peas, and canned cake, candy, fruit compote or starch pudding for dessert. Further, the list is growing, according to Mr. Wodicka, as fast as technological, packaging and distribution problems are solved.

Aerial Delivery Vital

One of the most urgent research programs of the Institute and its collaborators and contractors is that of aerial delivery. Its particular phase of the aerial delivery research is the preparation of supplies and equipment for aerial delivery, which at once focuses upon development of high energy-absorbing cushions, as well as suitable containers and packaging materials.

Aside from the urgency of the research because of its importance to military operations, there are two important reasons for developing improved techniques of preparation and delivery:

1. With present methods there is "an almost unbelievable" trajectory, with the result that vital supplies could land in locations inaccessible or enemy-held.

2. Extremely high cost of preparation.

Very little data are available on dynamic characteristics of energy absorbers and much of this information is inconclusive, according to Edward F. Williams, chief of the Institute's methods, standards and evaluation branch. He said that it is inconclusive because of a universal assumption that dynamic behavior was identical to the behavior of material in a compression testing machine. What they are finding now, Mr. Williams explained, is that this assumption is subject to modification.

It is valid, according to results attained with improved instrumentation, where a cushion is stretched within its elastic limit. But where materials have slow recovery, or are crushable (such as paper honeycomb and foamed plastics) the dynamic energy absorbing capacities are much higher than those arrived at by integration of the testing machine stress-strain curve. This and related problems of materials and methods are now under study, he noted, predicting a reduction in preparation cost from over a dollar per gross pound to

(Continued on Page 41)

Editor's note

Probably every man who served in World War II can recall at least a few officers who never would have reached the upper ranks had it not been for the sudden enlargement of the services in order to fight the war. Likewise, many a business executive can cite graphic examples of waste and inefficiency throughout the federal government. But since the inadequacies and incompetencies are too well documented to require comment, it is unfortunate that so much conscientious and devoted service goes unheralded. Close examination of the work of the QM Food and Container Institute makes it reasonable to suggest that the taxpayers are getting their money's worth—plus. The Institute's landmark work represents some notable forward thinking of the packaging field.

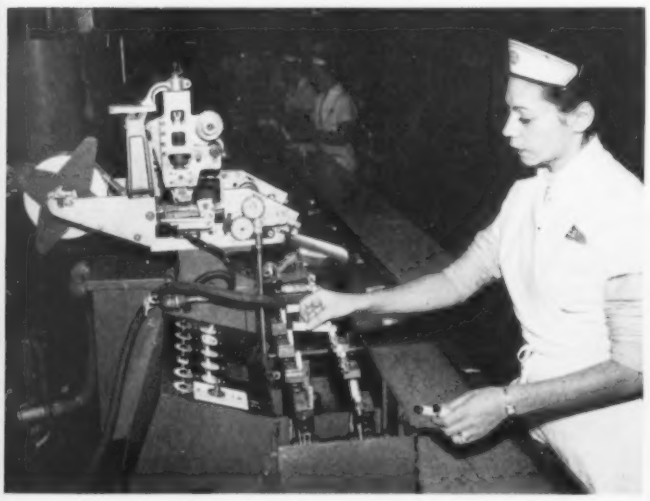
R. B. H.

Roll labeling in the ethical drug field

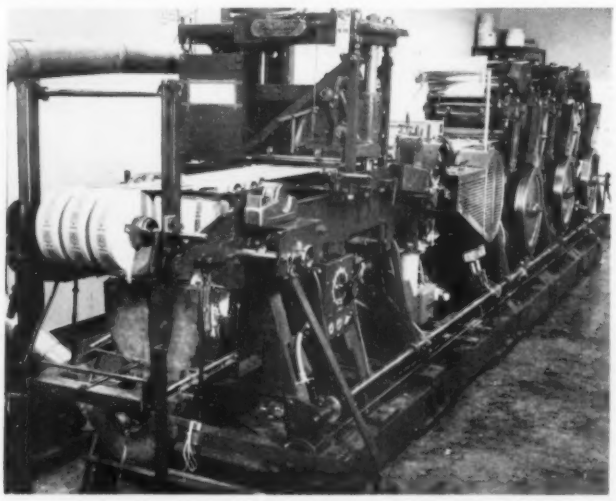
By E. R. Hamm,
Production Manager,
Sharp & Dohme
Division of Merck & Co., Inc.,
Philadelphia

Four years of effort and experiment went into the development of a more economic method of label printing, labeling, and label control of 70,000,000 labels a year for 2,500 products and sizes. To develop the potential economies, simplification was required. Result: 300 label sizes reduced to 34; background tints reduced from about 1,000 to 34. Then the economy of roll-labeling became possible. The new method retains the high accuracy of control that is imperative in the drug and pharmaceutical industry.

A. Preparatory to labeling, this girl is placing collapsible metal tubes into position. Using labels cut from rolls, this machine automatically applies a label to each tube. Labels are of thermoplastic-coated paper. There is a mechanical cut-off action and an application principle that uses "picker fingers" in the label transfer.



B. Sharp & Dohme has its own printing department for the printing of labels. Special features and requirements of the press seen here include ability to handle short runs and provide quick changeover. There are three movable type top printing units, one toggle die-cutting unit, and an automatic rewind.



Edward R. Hamm has been associated with Sharp & Dohme for seven years. Prior thereto he was with the Revlon organization and with The Great Atlantic & Pacific Tea Company. He was a plant manager for A & P's printing division and later for some of its food processing and packaging operations. After studying mechanical engineering at the University of Minnesota, Mr. Hamm devoted five years to studying (with an apprenticeship) photoengraving and color reproduction. He then worked in various printing plants, in connection with lithographic, letterpress, photographic and photogravure methods. He is now active in the committee work of American Drug Manufacturers Association and American Pharmaceutical Manufacturers Association.

The drug industry spends millions of dollars yearly to insure that its products may be used safely and with complete confidence by the consumer. No expense is spared, nor should be, in this regard. The justification is human life itself.

To assure unfailing and successful enforcement of this policy, exacting controls are established, and careful checking routines are set up throughout all manufacturing and packaging processes. However, as can be imagined, the problem of controlling costs in these areas is difficult. At times there are established double checks and triple checks, or even more. Management might well ask: How much of this routine is reasonable? It is always problematical as to just what constitutes a reasonable cost in these areas.

Our management was interested in investigating the controls we were using to check and inspect our labels. It seems unnecessary to emphasize the critical nature of this check. Suffice it to say that every precaution is taken to insure that each and every container is correctly labeled. So, we were not surprised when our investigation revealed an elaborate, but necessary, system of checking and inspecting labels. Specifically, we were employing controls in the preparation of copy, proof-reading, inspection in the printing department and also in the copy control area, coding operations, post-coding inspection, and post-application inspection.

How could we reduce the number of checks being made without increasing the chance for error? Basically, that was our problem.

Why Not Labels In Rolls?

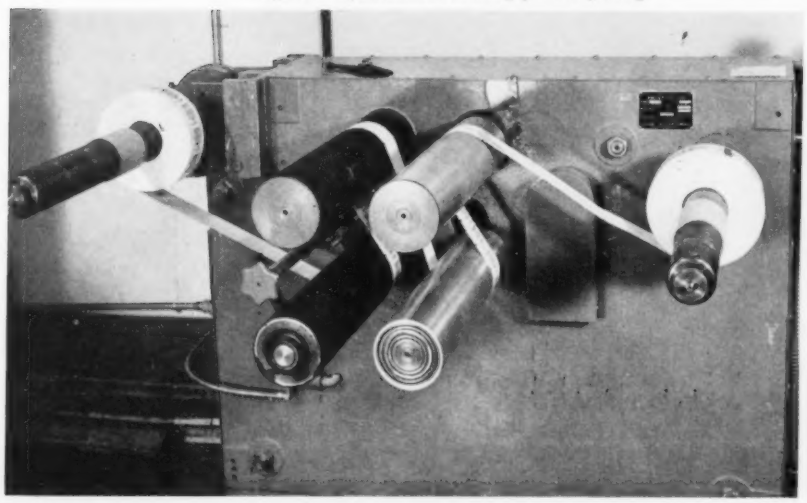
It seemed that most of our errors would occur by reason of the fact that each one of our individual labels constituted an individual unit, subject to mixing or erroneous coding, by their very nature. And when our investigation turned up approximately 2,500 different product labels and a volume in excess of 70,000,000 labels, there was every indication that the existing system was doing a superlative job. It was safe to say that only very minor improvements could be made by attempting to modify the system as long as the basic nature of the label remained the same. Therefore, we concentrated on this aspect of the problem, that is, changing the basic nature of the label.

The principle we chose was that of printing labels on a continuous web in such a manner that each label was directly connected with the preceding and succeeding label; the web then being linearly die-cut along the direction of web travel in exact register with the printed matter, and then being rewound into a roll for storage. This principle was selected because the inherent nature of this process would prevent mixing labels on a roll. That is to say, the last label printed would have the same identity as the first. Here was a basis for a new approach to eliminating checks and rechecks on labels.

Seek New Labeling Method

Our investigation now turned to an examination of the possible pitfalls that we might encounter if we should attempt to install a roll label program in place of our existing system. Such things as printing, rewinding, coding and labeling equipment had to be studied. An evaluation of label sizes and designs was important. Also, the ever-present cost factors had to be evaluated.

C. In addition to the press, Sharp & Dohme uses this rewind unit in order to make a firm, even roll, and to make splices during rewinding, thus eliminating splices on the press. Occasionally, unprinted rolls damaged in shipment need rewinding prior to printing.



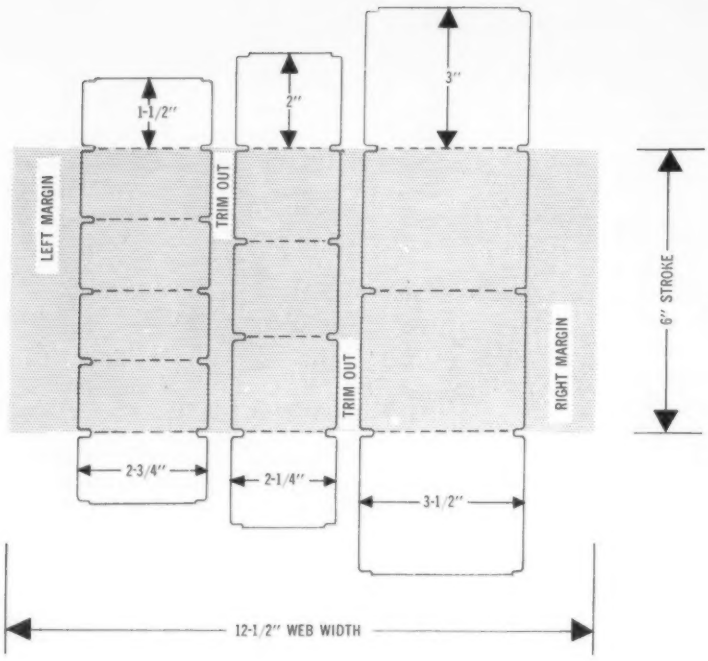


FIGURE D

D. This is one of the compatible combinations of labels, so that three different sizes of labels may be run simultaneously on the printing press. By developing combinations of label heights and widths compatible with containers, the number of sizes has been reduced from 300 to 34.

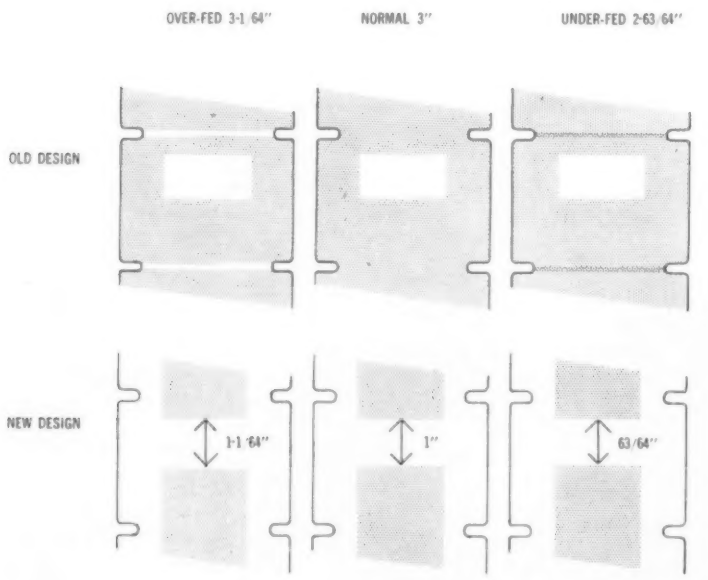


FIGURE E

E. A design change incorporating a color break furnishes a solution to the problem caused by overfeeding and underfeeding of the web. Without color breaks there would be white spaces between labels (overfeeding) or overlapping backgrounds of color (underfeeding).

It soon became apparent that we would have to develop a method of using roll labels in the packaging areas before any real work could begin in other departments. Ideally, we wanted to apply the roll labels directly to the containers. Our operations indicated that we could justify economically the purchase of equipment for doing this with our metal tubes. However, since equipment was not available to do this, it became necessary to develop a machine that would satisfy our requirements.

We asked Dumatic Industries to investigate the possible development of this type machine and to build a prototype, if possible. It agreed to do this. Mr. M. Seifert, president of the firm, visualized the basic ideas which would permit the development of this machine. Working closely with our engineering division, he successfully crystalized these ideas into a machine which would automatically label metal tubes directly from a roll. (See Figure A.)

The principle of this machine was based on the use of thermoplastic coated paper. The cut-off action was mechanical, and the application principle involved the use of "picker fingers" which carried vacuum to transport the label, and heating elements to activate the thermoplastic material while the label was in transit. The development of this machine involved four years of experimentation and testing. The application principle is suitable for other containers, but economic considerations have prevented further development of this idea.

Having determined that we could successfully use roll labels in our packaging area, we went ahead with the rest of our program.

Choosing A Press

Our next problem was to select the proper printing press. Basically, we required equipment which would handle short runs, be changed over quickly and would maintain our quality. We selected a press from the New Era Manufacturing Company. The model selected was a 3/0 9" x 12" unit. The combination included three movable type top printing units,

one toggle die-cutting unit and an automatic rewind unit.

In addition to the press, shown in Figure B, we purchased a Stanford Engineering Company rewind unit which would enable us to rewind the printed rolls in order to make a firm, even roll. (See Figure C.) In addition, this unit permits us to do any splicing during rewinding, thus eliminating splicing on the press when we have wash-up, register problems, etc., and thereby eliminating delays in printing. Also, we have to occasionally rewind the unprinted rolls whenever the rolls are badly handled in shipment.

The limitations of this press established a basis for standardization of label sizes and designs, for it soon became evident that we could not economically print all the various sizes and designs of labels which were in our line at that time, on this press.

The standardization of label sizes presented a challenge, because of the large number of primary containers which we used. There were a variety of sizes and materials to be considered. Our package line included bottles, metal tubes, ampuls, plastic vials and squeezable plastic bottles, in sizes ranging from a 1-cc. ampul to one-gallon containers. Our investigation turned up over 300 different label sizes and as many as two dozen different layout designs on a particular size. So, you see, there were many variables to be considered.

Dimensional Problems

We began with the axiomatic statement: "The dimension of the label in the grain direction must be equal to or a divisor of the stroke length, which is that amount of paper which is carried forward between printing impressions." We have considered that the grain direction must be related to the container in a vertical direction, and we have standardized our labels on this basis.

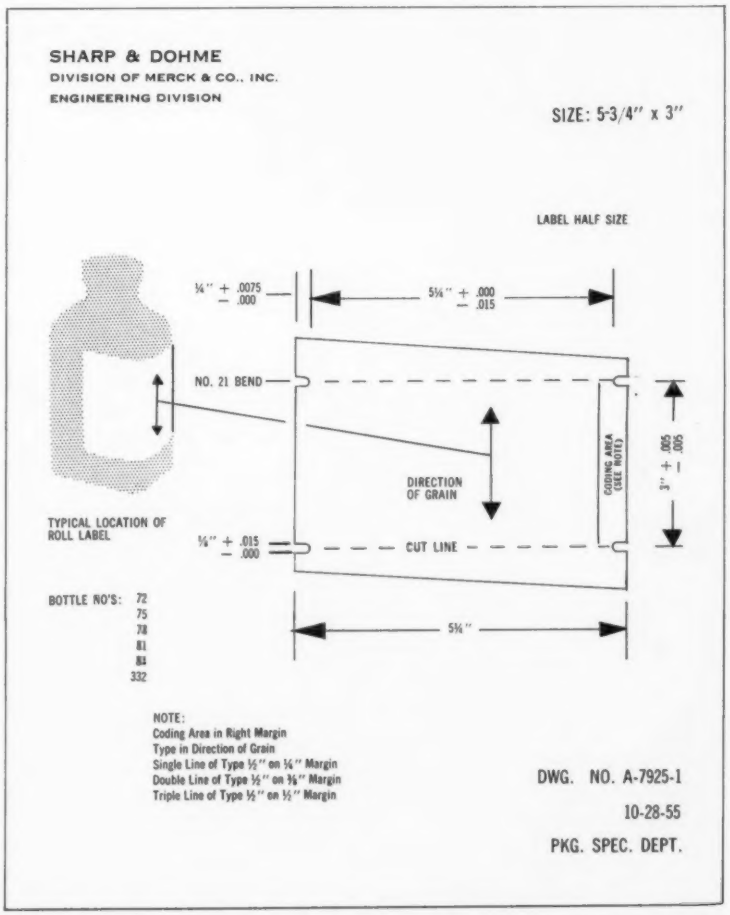
Therefore, we could state that the label height was directly related to the stroke length. An examination of existing label heights revealed a pattern which enabled us to standardize on six stroke lengths, which gave us a range of twelve sizes from 15/16" to 3¾". The sizes selected insured the continued use of our existing high-speed labeling machine parts, which are quite expensive.

It was evident that if we were to maintain good press bed utilization, consideration would have to be given to relating label widths to web widths. However, we had to weigh against this the problem of maximum label coverage on each container. Wherever possible we selected sizes which were divisors of the web width, allowing for trim-out, and the balance we selected on the basis of factors which were peculiar to the container, such as circumference of tubes, etc. We decided on a range of 18 sizes from 1" to 5¾", on the basis of the foregoing considerations.

Selecting various combinations of widths and heights which were compatible with our containers, we were able to reduce our total number of sizes from approximately 300 to 34. By reason of our approach we were assured that these labels could be run in compatible combinations on the New Era press. An example which illustrates this clearly is shown in Figure D.

Compatibility Of Design

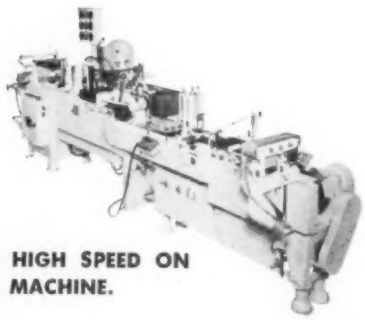
Having established size compatibility, we now had to solve the problem of design compatibility. We had accumulated a great variety of layouts and designs through the years. This problem was brought sharply into focus when we began to receive many complaints regarding design incompatibility from our roll label


SHARP & DOHME
DIVISION OF MERCK & CO., INC.
ENGINEERING DIVISION
SIZE: 5-3/4" x 3"
LABEL HALF SIZE
¼" + .0075 − .000
5¼" + .000 − .015
NO. 21 BEND
DIRECTION OF GRAIN
CODING AREA (SEE NOTE)
3" + .005 − .005
TYPICAL LOCATION OF ROLL LABEL
⅛" + .015 − .000
CUT LINE
BOTTLE NO'S: 72 75 78 81 83 332
5¼"
NOTE:
Coding Area in Right Margin
Type in Direction of Grain
Single Line of Type ½" on ¼" Margin
Double Line of Type ½" on ⅜" Margin
Triple Line of Type ½" on ½" Margin
DWG. NO. A-7925-1
10-28-55
PKG. SPEC. DEPT.

F. For each roll label there are detailed specifications, including drawings, issued by the company specifications department. The entire standardization program rests on attention to such details, and a typical specification is virtually a complete summary of the standardization program.

PROTECTED BY RIEGEL

Q-T SNOW-WHIP FROSTING MIX USES HEAT-SEAL POUCH OF RIEGEL'S POLY-COATED LAMINATED AMBER GLASSINE.



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suppliers during our early experimentation with application equipment.

The complaints had to do with the lack of a color break on our background plates. Apparently, this is a necessity in order to assure quality printing on web-fed presses. For example, when the web was underfed we had overlapping backgrounds, and when it was overfed we developed white spaces between labels.

Neither condition was acceptable, and the only solution apparent to us involved a design change which would employ a color break. Working through our advertising area, and with the approval of the sales division, we were able to devise a change in our existing layout which would give us the design we required. Figure E gives an illustration of the problem and how it was overcome by redesign.

Printing Layout Important

The next step presented an even more difficult problem, which involved the printing of a great variety of labels with a minimum of press changeover time. Our studies had indicated that we could not afford to *run* less than 40 per cent of the press time available on a two-shift basis in order to keep capacity equal with requirements. If we had to change two or three printing heads between each run it would not be possible to achieve this figure.

Therefore, we resolved to attempt to establish standard layouts which would permit only one basic background for each label size. To give some idea of this problem, we had approximately 1,000 background tints which would have to be reduced to 34. If the standardization could be accomplished, we would be able to reduce our potential make-ready and register time by approximately 50 per cent. This would be possible because all runs would be combined in such a manner that all current orders for a given label size would be run consecutively by utilizing the same make-ready for the background plates and the dies.

Also, the register time would be reduced by reason of these two elements being in register from the original form. If we were running a two-color label, for example, and wished to continue with another label of the same size, we would simply lift the "type" plate of the first label and substitute the "type" plate of the second label. In order to accomplish this standardization and to assure its enforcement, we installed a layout artist in our copy control area, who is charged with this responsibility. We have had a great degree of success with this idea and wish to state that this concept is tremendously important to anyone contemplating the use of roll labels.

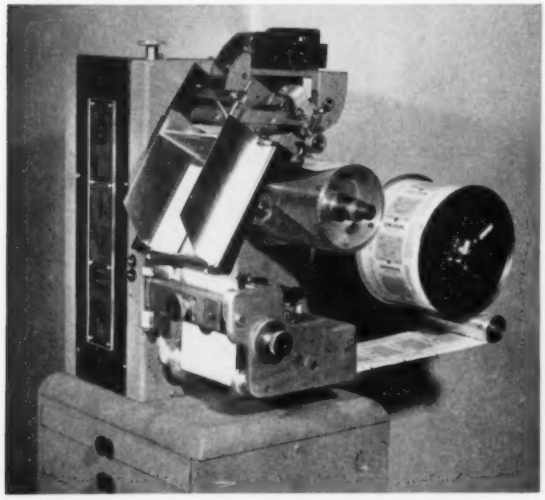
Develop Cutting, Coding Unit

Our specifications department has issued detailed drawings of each roll label which summarizes completely the entire standardization program. (See Figure F.)

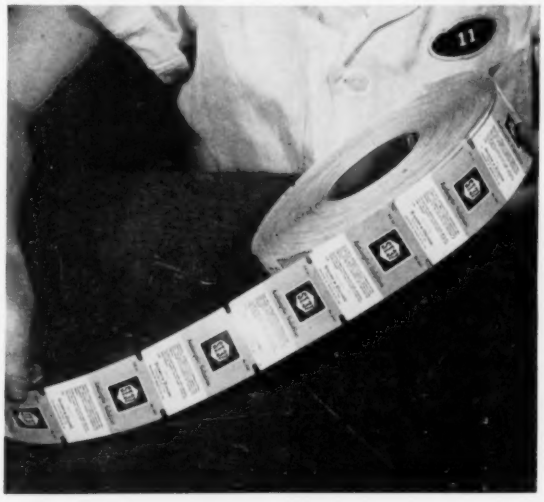
We still had the problem of how to apply roll labels to containers other than metal tubes. We knew that while the savings by reason of elimination of inspection, checking and coding were of considerable magnitude, we could not justify replacing all of our labeling equipment with new equipment. How, then, could we realize these savings without replacement of existing labeling equipment? It was evident that we would have to develop a machine which would code and cut roll labels.

If this were possible, we would then be able to supply rolls to the production area with the intention that the coding and cutting operations be performed by the label machine operator. It would be necessary to remove the cut labels from the magazine of this device and place them in the magazine of the labeling machine. We hasten to point out that this is not an ideal condition due to the re-introduction of "cut label"

G. This machine codes and cuts the roll labels — for handling and transfer to the labeler. There is a pre-set counter, whose use prevents wasting of labels due to cutting in excess of a given requirement.



H. This roll and its labels are typical of Sharp & Dohme's current roll labeling operation. Note the uniformity of printing, with neither breaks nor overlapping between labels. Use of labels in rolls prevents mixing.



handling in the course of operation.

However, the techniques which would be employed to overcome this problem (such as the location of this device in relation to the labeling machine) would be sufficient to insure against mixed labels.

We presented the problem of developing this machine to the Oliver Machinery Company. With the help of our engineering division, Oliver provided a machine that was satisfactory to the extent of improving our existing coding and cutting operations. In addition, this machine employs a counting device which can be pre-set for the number required, thereby preventing excessive waste of labels. (See Figure G.)

Other problems required attention, such as warehousing, economic ordering patterns, and similar questions. These problems were not peculiar to roll labels, and are therefore outside the scope of this article.

We had accomplished what we had set out to do. By changing the basic nature of the label, we had been able to eliminate all checking and inspection routines with the exception of proofreading and final approval on finished printing. We have now streamlined our operations and we have eliminated, to a great degree, the human element of error as well as reducing costs.

The factors contributing to the successful application of a new idea are many and are worthy of consideration.

Creative Atmosphere Vital

First, management plays a key role in the success of a new program. We all know that new ideas are basic for a progressive company. The atmosphere for creative thinking is established by management. Money is not the most important factor. Most people are reluctant to jeopardize their position to accept responsibility for an idea that might fail. In fact, why should they, unless the rewards are great? Therefore, encouragement, even with some failures, is necessary as well as a credit when there is a successful conclusion in a project of this character.

Further, in the complex structure of today's business and its high degree of specialization, many men and departments are involved in the successful application of a new idea. While there are no specific rules for proper handling of projects for all companies, it is management's responsibility to insure cooperation of all departments concerned.

The handling of roll labels at Sharp & Dohme involved the ideas of many men, as well as the cooperation of different departments. Therefore, credit for the successful application of this idea does not belong to one man or department, but to many. We made many false starts and spent money which, in retrospect, was unnecessary.

The other part of this picture has to do with machinery manufacturers. There has been criticism that these companies are not progressive. However, a machinery manufacturer cannot make improvements unless he is aware of the needs of a user. Therefore, it is to our interest that we keep the machinery people aware of our problems and contribute ideas to them wherever possible.

We, because of the peculiarities of our problems, have occasion to develop new equipment. However, most of our work is of a prototype nature and we depend upon the machinery people to build our production department.

The question is asked: Would we start this project or another, knowing the disappointments and problems we have encountered? Because of the attitude of our management, we are encouraged to develop ideas, and we feel there is a lot to be done. We believe that we should print, cut, code and apply labels directly to the bottles in one operation. We now ask, why can't we handle cartons in the same manner as we are handling labels? We are constantly looking for high-speed equipment with quick changeover time. We feel that there is a tremendous need for greater development in the packaging field and believe that industry must play an important part in this development.

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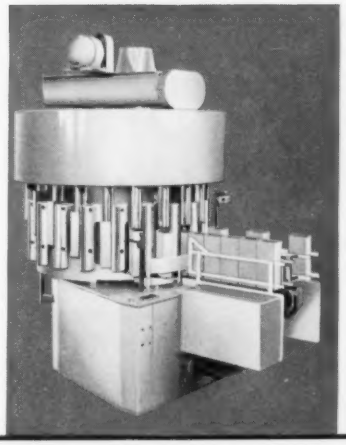

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Battery acid packaging requires unique machinery, new packaging line methods

Here is something new in packaging: When Globe-Union Inc. decided to produce dry charge batteries, it had to come up with a new package. This article tells how Globe-Union met the challenge of shipping battery acid in separate containers accompanying the battery cases.

Development of dry charge batteries and the packaging of Dri-Pak battery acid for these items is bringing about major changes in packaging equipment and methods for Globe-Union Inc., Milwaukee manufacturer of batteries, spark plugs, electronic parts and other items. What happens is that Globe-Union now ships batteries with a dry charge and with the acid in separate containers. Formerly, Globe-Union put the acid into battery cells prior to shipment of batteries.

Use of dry charge batteries offers many advantages to those who sell batteries, such as service stations. For example, storage life prior to use is prolonged — and all the attendant does is pour in the acid prior to installing the new battery. But all this presented a number of engineering and development problems to Globe-Union.

MUCH ENGINEERING. From a packaging standpoint, focal points of the switch to dry charge batteries involved (1) getting the right container for the acid; (2) developing a machine with which to fill this container, and (3) coming up with new interior packing and new packaging line methods by which to complete each battery package.

While this involved many different phases of engineering development, these phases all have one common feature: A recognition of the hazardous and destructive nature of acid, and the providing of mechanical and procedural safeguards all the way along. Also, the entire development involved new thinking — since the entire program is a new idea.

Evolving A Container

Globe-Union's current acid package is a 1.4-quart light weight battery acid bottle, of polyethylene. Each bottle has a polyethylene cap which is heat sealed (in effect, fused) to the bottle. Each bottle has a capacity of 45 fluid ounces and is the largest bottle produced to date for this usage; it is a blown bottle. With this heat sealing cap, a user merely cuts off the nozzle point to pour out the acid.

Before coming to this bottle, Globe-Union tried a screw cap bottle. Also, other types of bottles came into the picture, but failed to meet the company's objectives. In going to the heat seal cap, Globe-Union wanted (1) as wide an opening as possible for filling, and (2) an easy-to-use pouring nozzle — with a cut-off type of opening.

STRENGTH REQUIREMENTS. Before accepting the present bottle for production use, Globe-Union put it through a series of hot and cold tests to determine its ability to withstand higher and lower temperatures than actual conditions can present. Also, the bottle went through many tests of ability to withstand shock. While normal tests of this type at Globe-Union entail a 20-foot drop, these bottles have been dropped from a three-story window — without experiencing any container failure.

Getting A New Filler

Engineers of Globe-Union designed and built a filling machine to handle these battery acid bottles. While this unit is the design and development of the company engineers, it utilizes commercially available components and standard items as far as possible.

One real problem was that the filler had to be built as quickly as possible — so that the dry charge program did not bog down for want of filling machinery. Principal design objectives included (1) safety, (2) accuracy of fill, (3) ability to handle the acid, and (4) controls and adjustments for quantity changes.

MATERIALS SIGNIFICANT. The engineers used Carpenter 20 acid-resistant stainless steel for all parts coming in contact with acid, such as filling heads, drip catching equipment, and bottle holders. Lucite bases, which hold containers during filling, have holders of this material.

Likewise, the painting required

special attention. All machine parts have been coated first with phosphate paint; second, with Herisite, to give acid resistance, and third, with Globe-Union's regular factory paint. The first two coatings protect the metal of these parts against splashing or other damage that may arise with the handling of acid.

Functional Details

Once the engineers solved the problem of getting an accurate fill, which is possible to a point of plus or minus a few grams, they developed a rapid means of adjustment — necessary because battery acid bottles vary in their required fills, to meet the requirements of various sizes of batteries the company produces. Now, the operator changes from one volume of fill to another simply by turning a wheel. Use of a gauge and visual inspection facilitate his work.

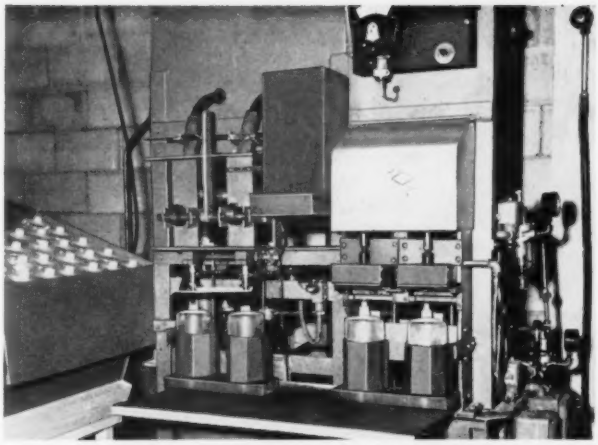
The heat sealing mechanism uses an air line, to provide a measured amount of air at a controlled low pressure. This measured amount is necessary in connection with the close control of temperature and time dwell for heat sealing. There is a temperature gauge for each heat sealer.

Movement of acid. From a mixing tank the acid flows by gravity (with the aid of a syphoning action) to the filler. There is a pinch valve to stop the flow. The acid moves through a polyethylene pipe. A float valve controls the level, in order to maintain it uniformly at the machine.

There are several safety features with which to control the flow of acid. If no bottle is in filling position, no fill takes place. There is a rubber diaphragm to shut off the flow to the machine. An emergency pinch valve may be used to stop the acid movement. A control lever is within easy reach of the operator.

Filling Of Bottles

Arriving at the filling machine in corrugated boxes, each of which goes on an angled table adjacent to the filler, empty bottles receive the designated quantity of acid. Prior to reaching the filling point these bottles receive a color code indicating the height of fill or quantity of acid they



To fill its polyethylene acid bottles Globe-Union's engineering department came up with this specially-built machine. Safety, accuracy of fill, rapid adjustment to varying bottle fill requirements, and ability to withstand acid are among the major features of this equipment.

For transfer to the assembling line the filled bottles of acid go into this storage rack after leaving the filler. Angled rack at left holds supplies of empty containers. On the filler all parts coming in contact with acid are of Carpenter 20 acid-resistant stainless steel.

This wheeled rack (which is moved along conveyor line in order to minimize manual bottle carrying) holds filled, sealed bottles, to which an attendant applies warning labels prior to placing bottles in corrugated boxes. These boxes contain battery cases, acid bottles — and instructions.

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are to receive at the filling machine.

Two bottles fill at a time. The operator places two bottles in holders secured to a Lucite base. He then slides the base into place so that bottles rest against stops, after which he actuates the fill. After filling two bottles he spots the caps on the bottles, then slides the base holding these bottles into place for the heat sealing operation.

HANDLING DRIPPAGE. Meanwhile, should any dripping of acid take place during the filling cycle, this acid falls to a drip pan — which automatically moves into place as a phase of the filling cycle. Actually, there is very little drip because the filling heads are designed for clean cut-off upon completion of fill. But such drippage as occurs simply goes into a reservoir.

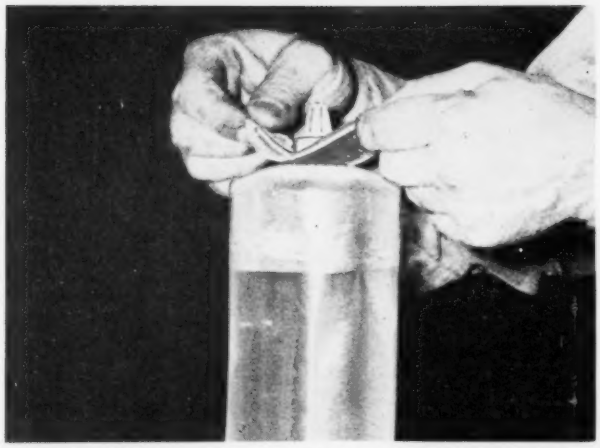
Next, the operator places the filled, sealed bottles on a truck rack for transfer to the packaging and assembling line — where the bottles meet their batteries. The machine attendant wears protective clothing and glasses while doing his job.

Bottles Meet Batteries

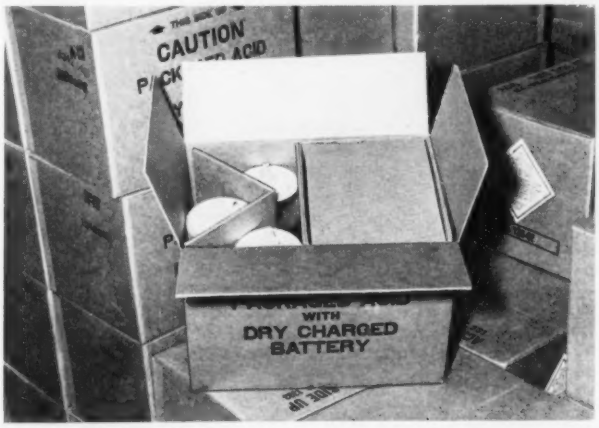
In developing methods of completing these packages and assembling the components, Globe-Union engineers had very little leeway: I. C. C. regulations fix the details of packaging where items such as acid are involved. The batteries and their requirements made other fixed problems, such as the number of battery acid bottles per battery varying with the model.

Principal engineering jobs were the designing and use of interior packing — to hold the acid bottles within the corrugated case holding the battery case itself, and the assembling procedures on the line. Special features are the use of warning labels on bottles, as required by law; the use of a sleeve as a holder during subsequent pouring, and positioning of all these within the shipping case.

INTERIOR PACKING. Chief object was to make one corrugated filler sheet (1) of minimum size, (2) to serve as many packages as possible. Now, just four different sheets serve the packaging of the entire dry charge



Sufficiently secure to actually hold a bottle on its own, this warning label is tightly in place when each bottle reaches the user, who will pour out its contents. Feature of the entire dry charge program is that a service station attendant adds the acid just before putting a battery into use.



Use of reverse creases in these corrugated filler sheets makes possible using the same sheet for a number of different interior packaging arrangements. Different battery cases are not only of varying sizes and shapes, but have different quantities of acid bottles for use.

To pour the contents of a bottle into its battery case, a user merely cuts open the heat sealed closure, as shown here, and tips the bottle for pouring. These illustrations and explanatory notes are part of detailed instructions supplied with the new Globe-Union package.

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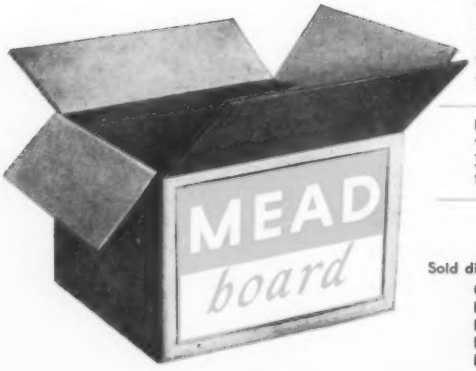

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program for the full line of batteries involved.

Focal point of the insert piece is its use of a reverse crease. While the sheet is creased just once for a package containing three acid bottles, the reverse crease is used where four and five bottles go into a case. For some battery models a second filler sheet is necessary, as well as two-piece partitions.

Actual engineering task involved experimentation and the process of elimination to solve this interior packing problem in a practical way. Globe-Union's packaging engineer worked with actual battery cases and bottles while working out the use of filler sheets — to make each filler serve as many packages as possible.

Assembling Of Components

To secure the label to the acid bottle, an attendant merely slips the label over the neck of the bottle, pressing the label into place. Once in place the label locks under the rim of the neck — and holds strongly enough for a bottle to be lifted merely by lifting the circular label.

Not only do labeled bottles and the requisite interior packing go into each corrugated box but also a protective sleeve (one to each case, as one sleeve can be used with all bottles) for use during pouring operations.

COMPLETING PACKAGES. Other components include a corrugated battery saddle, which protects the terminals of the battery within the case; a bottle flag, carrying a warning of the importance of using the sleeve while pouring, and an instruction leaflet. Case bottoms are glued and when each case is loaded, it is stenciled, labeled and stapled.

Guide lines on cases facilitate the placement of glued customer labels. Code numbers and plant identifying data are stamped on each side. All cases, as well as interior packing pieces, are of 200-pound test corrugated, in accord with I. C. C. requirements. In connection with the assembling of components, there are wheeled trucks to carry acid bottles for loading into cases. This means that the acid moves along the line with the work, thus requiring minimum manual movement.

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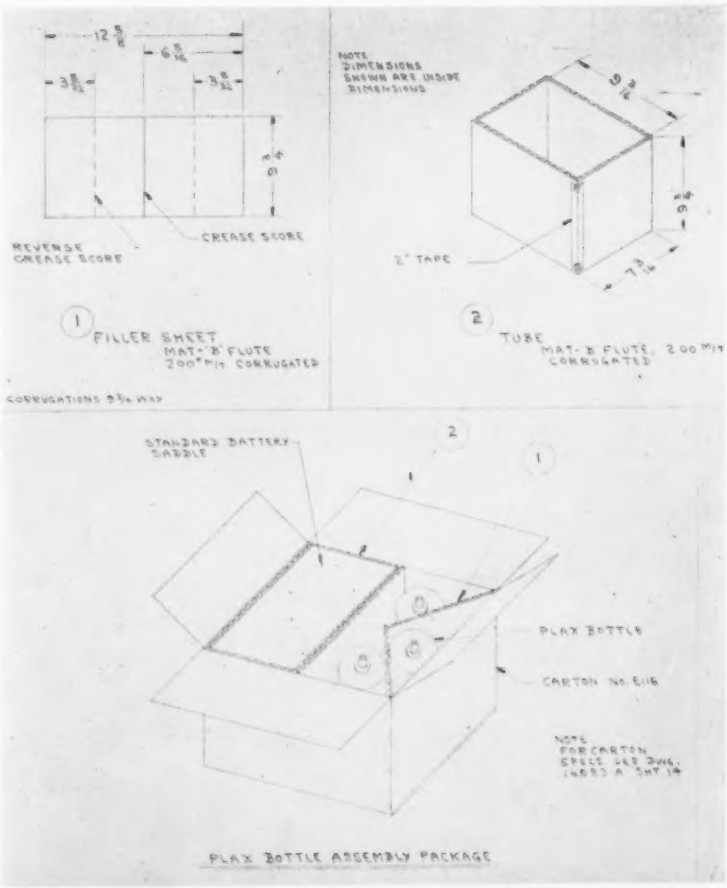
INTERNAL: DO NOT USE EMETICS OR BAKING SODA.
Give water with milk of magnesia or aluminum hydroxide gel. If these are not immediately available, give milk or white of eggs beaten with water.
CALL A PHYSICIAN

This warning label goes on the neck of every bottle of acid and remains securely in place, to warn the user. To be sure of its remaining in place without coming off or being accidentally pulled free of the bottle, it fits with sufficient security that one may lift a bottle by its label.



To hold package components intact within a corrugated box Globe-Union's engineers devised filler sheets that use reverse crease scores. While they may be folded once, as shown in this example, they may be folded in other ways, using some or all of the scores shown. These facsimile drawings also show the relationship of the filler sheets and the rest of the packaging assembly.

A streamlined way to manage the packaging function

By capitalizing on the ability of its managers and technicians to make speedy, cooperative packaging decisions, Bell & Howell Company uses an effective technique in making package changes. This article reviews the company's approach to a particular packaging problem and tells how it made a major change in its movie camera packaging.

By emphasizing a coordinated, integrated approach in all details of a packaging project, Bell & Howell Company, Chicago manufacturer of photographic equipment, manages its packaging function with unusual efficiency and flexibility. To companies accustomed to rigid, inflexible procedures, Bell & Howell's approach may seem easy-going. But its efficacy is shown by the fact that a recent packaging change reduced cost, improved package identification and provided better inventory control.

This change involved a consolidation — the use of one universal folding carton to replace six different set-up boxes. What took place in working it out and in coordinating the details (both within and without the company) is a case history of Bell & Howell packaging management.

When the project started, the emphasis was on getting improved packaging and display, so an executive of the sales promotion department became the project coordinator.

Coordinated Cooperation

While it happened to be a sales promotion man in this case, it might have been any other executive, depending on who was initiating the packaging change. The main idea is that one person assumes the responsibility for coordinating all details.

The coordinator brings representatives of pertinent departments into the discussion. He follows up on details as the project materializes, reviews its progress with those concerned, and works with the outside suppliers of packaging materials.

While there are many group conversations, there are no formal packaging committees, and cooperative discussion settles most questions. Bell & Howell executives emphasize that the success of this kind of packaging management depends on the ability of its executives to reach decisions by mutual consent; i n f o r m a l but thorough discussion e x p e d i t i o u s l y translates conflicting viewpoints into general agreement.

Switching To Cartons

A review of the steps taken in switching from set-up boxes to folding cartons illustrates this cooperative action, including the relationships with outside supplier representatives. In this case, after preliminary work with several suppliers, the coordinator and his associates selected the design submitted by Container Corporation of America as the most promising. So, development proceeded, both as to structural and functional design, and surface appearance.

Bell & Howell did not outline detailed materials specifications to Container Corporation, but rather gave it general performance requirements— and furnished its carton design laboratory a complete set of actual cameras to use in developing the carton and inserts. A key point in connection with the inserts was producing them so they would be easy to fold and handle on the packaging line.

Both user and supplier worked together on this. The supplier's representative studied the camera packaging line and made a number of experiments. Bell & Howell did no sample making or other package development work. However, as a phase of its maintenance of rigid quality standards, its laboratory tested the effect of various alternative packaging

This single folding carton replaces six different set-up boxes — through use of inserts developed to fit specific models of the movie camera line which uses the new packaging. After selecting a supplier, Bell & Howell let that company proceed with the package development and design work, including participation in planning the production line operation and use of the new packaging.

materials on camera surfaces, checking such points as material transfer.

Project Follow-up

As the development of the new packaging moved ahead, those participating in the change-over not only coordinated the details between departments, but paid particular attention to winning and retaining the enthusiasm of the packaging line workers. Basically, to them it means going from a package easy to handle to one harder to use. It was necessary to keep these workers sold on the advantages of the new packaging.

A vital point of follow-up was that of inventory control, in order to run out the old material in connection with the introduction of the cartons. It took nearly four months to do this, but at the end of this period only a negligible amount of old material was left — for scrapping. But the key to the change-over was the accurate scheduling of new packaging materials.

After the initial order for the new packaging was placed, the subsequent inventory problem belonged to the stock record department. Using the camera production schedule as a basis for planning, this department worked out a six to nine months' procurement program, subject to monthly revision.

Bell & Howell
PACKAGING SUPPLY SPECIFICATION

PKG. SUPPLY SPEC. NO. 671
METHOD PACK NO. 0816
DATE 3/19/56
PAGE 1 OF 1

PRODUCT DESCRIPTION AND/OR PART NUMBER
MONTEREY DeLUXE 8MM. MOVIE CAMERA

DESIGN NUMBER 252-B | DIVISION PACKED FOR B&H | UNITS PER PKG. One

ITEM DESCRIPTION	METHODS MATERIAL NO.	MATERIAL SPECIFICATION
DISPLAY CARTON	0816-L	Frame-Vue Lid. Size 10 9/16 x 2 11/16". Caliper of Board. .028 Super-white patent coated Kraft back. 4-Color off-set, plus 2-Color letterpress and varnish.
	0816-B	Frame-Vue Bottom. Size 10 1/8 x 8 1/4 x 2 1/8". Caliper .028 Super-white patent coated Kraft back. 2-Color Grey and Black, letterpress and varnish.
	0081-A	Die-cut insert. Size 5 3/8 x 3 3/16 x 2 11/16". Caliper .028 Super-white patent coated Kraft back. 2-Color Yellow and Red off-set, with Blue and Black letterpress and varnish.
	0081-B	Die-cut insert. Size 7 x 3 3/8 x 1 7/8". 2-Color Yellow and Red off-set with Blue and Black letterpress and varnish. Caliper .028 Super-white patent coated Kraft back.
	0081-C	Pad. 200# Test Corrugated with B-Flute. 8 3/4 x 7".
	0081-D	Cut-scored sheet. 200# Test Corrugated with B-Flute Blank Size 15 1/4 x 7 1/8".
	0081-E	Die-cut sheet. 200# Test Corrugated with B-Flute. Blank Size 10 1/2 x 9 15/16".
	0081-F	Regular Scored Sheet. 200# Test Corrugated with A-Flute. Size 13 5/16 x 1 5/8". Blank
Primary Shipping Container	0816-C	Die-cut Reverse Tuck Container. 125# Test Corrugated with B-Flute Blank. Size 22 3/4 x 26 1/4". Mfr. Joint glued. Printed 1-Color on end tuck.
Camera Price Tape	C-4	Pick-off pressure sensitive tape. Affixed to method number 0081-A
Camera Design Tape	D-11	Permanent type pressure sensitive tape. Affixed to method number 0816-L
Instruction Booklet	15716	Camera Instructions and Guarantee Registration Card

DISTRIBUTION: General
ISSUED BY HRA | DEPT. NO. 831 | DATE 3/19/56
APVD BY HMS | DEPT NO. 831 | DATE 3/19/56
FORM 35229 (1-56)

Important feature of Bell & Howell coordination of packaging details between departments is the adequate recording of details. This specification sheet not only apprises all departments of the package details but carries appropriate references to the methods records. This single sheet constitutes a complete summary of the package for the camera in question, minimizing chance for error.

Intra-Company Coordination

Relationships between departments require coordination in order to consummate a project such as this. Generally, the purchasing department places the initial order, based on specifications received from the packaging engineer. In this case, the coordinator was responsible for providing all necessary information to the purchasing department.

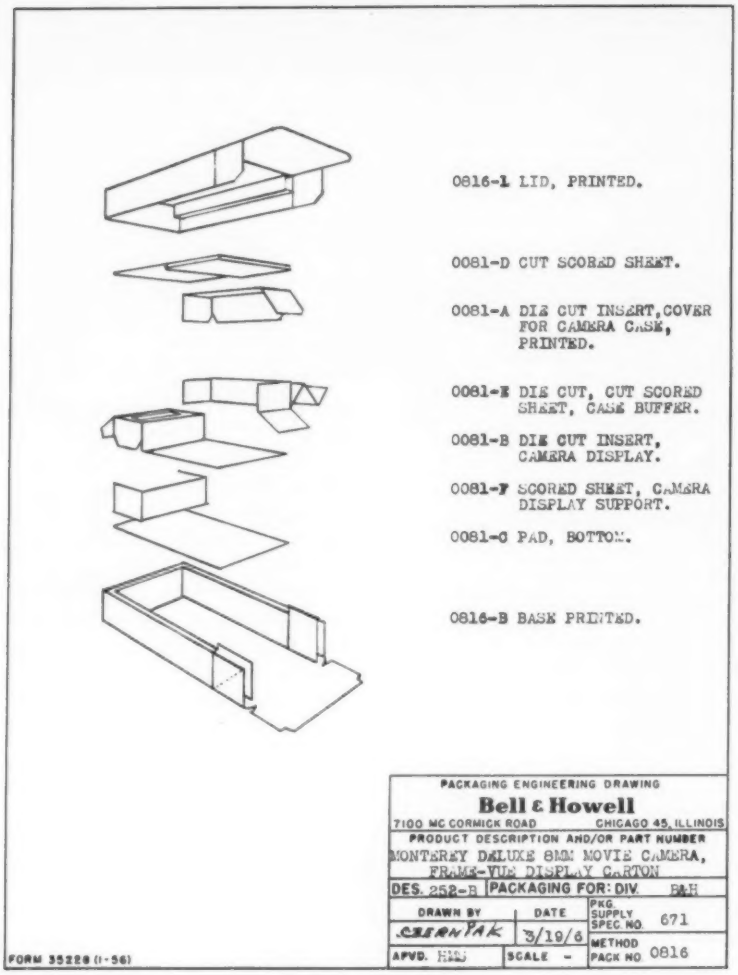
This kind of flexibility does not disrupt the structural and functional organization for packaging, but rather serves to emphasize the ease with which projects may be carried out.

In contrast to this special-project type of handling, usually when a new package becomes necessary, Bell & Howell's packaging engineer first analyzes the product being packaged. He determines the stresses and shocks that transmit to the item, considers its fragility, reviews alternative shipping methods to suggest the most suitable one, and looks at such special features as the need of having a vapor inhibitor. He gets advice from suppliers of packaging material, and he consults the company's stock record department for pertinent data. Once the packaging specifications crystalize, they go to the purchasing department.

Details of Purchasing

Typically, the function of the purchasing department is to buy in accord with these specifications. This department does no design work, exercizes no judgment as to purely packaging details, and confines its function to the technique of purchasing as such. In doing this job, the purchasing department maintains its list of approved suppliers, and is constantly interviewing present and prospective suppliers.

In the case of the switch from set-up boxes to folding cartons for the amateur movie camera lines, the coordinator stepped out of the picture after the initial order was placed, and the usual procedure was followed in subsequent orders. Re-orders are based on requisitions from the stock record department, which has supervision of packaging material inventories and, in turn, furnishes supplies to the packaging department upon requisition.



Using the components enumerated on the specification sheet this engineering drawing identifies all parts of the package and their relationship to the entire assembly. Note that the drawing is cross-referenced to the specification sheet and also carries the methods numbers. Since all departments use the same records and methods books there is no confusion concerning package components.

The stock record department keeps a perpetual inventory covering withdrawals and replacements of packaging materials. In handling the switch from boxes to cartons, the stock record department planned its schedule on a six to nine months' basis which not only facilitated running out the old materials but also provided a backlog in the event of upward revisions of the camera production schedule.

Launching Carton Use

Once the new package won the approval of the various departments the initial order was placed, attention turned to installing the use of cartons on the packaging line. How this took place illustrates the in-plant operational aspect of Bell & Howell packaging management.

The first task of the packaging line supervisors was to work out a suitable flow of work. Working with Container Corporation, based in turn on a study of the Bell & Howell packaging line, these specialists came up with an efficient procedure with which to do the job. The company's industrial engineering department has twice timed and rated the jobs which the packaging line men worked out, without suggesting changes, thus indicating the effectiveness of the original method.

Packaging Line Sequences

Because of the rate and intermittency of production, the girls on the line do not work progressively, although there are two teams of three girls each who work together. One girl prepares and stacks the packaging materials used by two girls who pack cameras. A floor man delivers supplies to these workers. Cameras themselves reach the packaging line in plywood carrying racks; leather camera cases arrive in corrugated boxes, and supplies of wrapping paper are maintained at camera packing tables.

Meanwhile, a girl assembling cartons and inserts prepares a quantity, stacks up the units, ready for camera packing, and then transfers them to the camera packing tables. Once cartons receive their cameras and are closed, they go into corrugated sleeves to protect carton surfaces against abrasion. For multiple unit shipments there are master corrugated boxes.

Focal point of control for the packaging operation is the serial number for each camera. At all stages, these numbers must coincide with the records accompanying the packaging orders. Also, the serial numbers must be checked in regard to model numbers. This is one of the reasons for using one person for each complete job instead of having three girls work progressively. The chance for error is reduced. However, a time study was made in advance to assure that one girl could do the entire packaging job.

Solving Of Problems

During initial use of the new cartons and inserts, some difficulty occurred with one of the camera models, but a repositioning of components within the package solved the problem. What happened was that the particular camera was too heavy to ride in the way the structural design intended; it simply could not ship that way.

Once this change was made, the difficulty ceased — and test shipments indicated that the package was satisfactory. Test shipments are a definite phase of Bell & Howell packaging management. In this case, as with others, the person responsible for the

particular packaging program followed up on the details of shipment as well as other phases of the job.

An important feature in keeping these details straight, including the initiation of the new packaging materials on the line, is allocation and use of methods numbers. As with other Bell & Howell packaging, the detailed methods are recorded, and the numbers identify the various methods. These numbers facilitate the informing of all departments as well as line personnel. Whether it is for the purchasing department or for a girl who packs the cameras, the methods number identifies a particular package or insert.

Training Packagers

Proper training of the girls working on the line was an important step in making the change from boxes to cartons. This packaging line handles other photographic items in addition to the amateur movie camera line, and the use of the new packaging represented a change in the girls' working methods. Verbal instructions by supervisor to experienced packers, and by these workers to newly-assigned packers served as the training medium.

When the new packaging first became available, the printed instructional material was not yet available — so the installation of the change depended on oral communication. The training emphasized the importance of reducing excess motion. This simplified the job of learning a new method — one more complicated than that being supplanted — and which was being installed while the old packaging was still in use.

Now, the packaging of these cameras is a matter of record, with forms, blueprints, material and dimensional specifications all recorded in the methods book. Maintenance of continuity of the program is simplified as the use of cartons becomes routine. However, none of this routinizing detracts from the basic effectiveness of the coordination and cooperative effort in making the entire change-over, enabling Bell & Howell to get its new packaging into operation as quickly as possible after the main decision was made.

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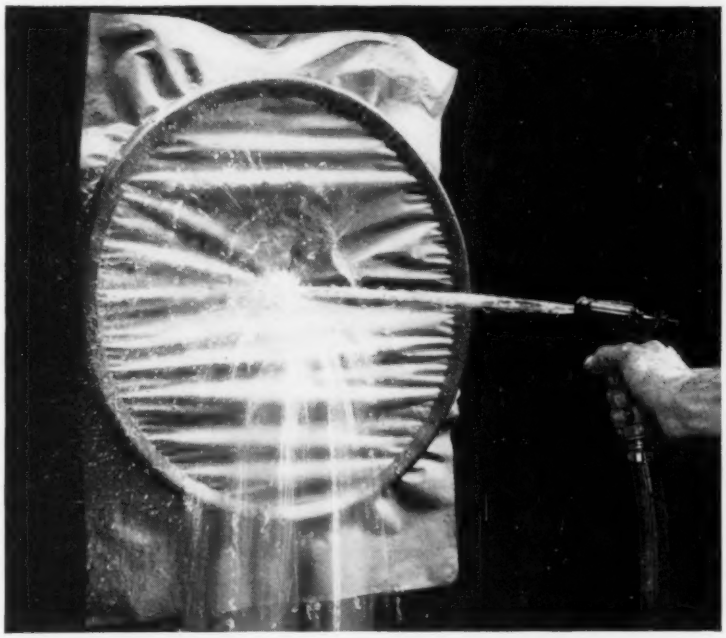

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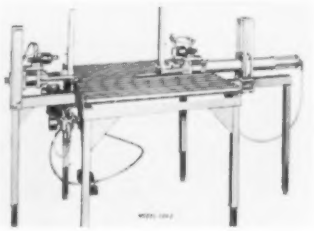
Bulk Fluid Container

Chase Bag Co. (in cooperation with Lawrence Paper Co. and Container Corp. of America) announces the new "Liqui-pak" bulk container for fluid products. It consists of a seamless three-mil polyethylene liner that has a five-inch opening at its top (for filling) and a water-resistant corrugated box whose features include a bituminous corrugating material, a flat crush strength of 750 psi., and a special waterproof adhesive. Once the inner liner is filled with product (such as 50 pounds of cream) the filling corner is twisted and closed. Circle No. 1.

Box Stapling Equipment

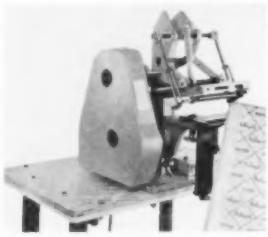
Container Stapling Corp. reports that its new Model CSH-2, a stapling unit that fastens flaps with an automatic



tap, closes boxes by mechanical means, and applies staples at a touch, operates without electrical connections. It has an automatic mechanical trip; there are two air-operated stapling heads, using pneumatic controls. The unit requires a supply of compressed air at a minimum of 60 psi. It handles cases of any height or length, whose widths range between three and 30½ inches. Circle No. 2.

Bag Marking Machinery

Markem Machine Co. says that its new flat surface printer, Model 45A, permits the imprinting of ingredient information and other variable data on bags preprinted with brand name, trade-



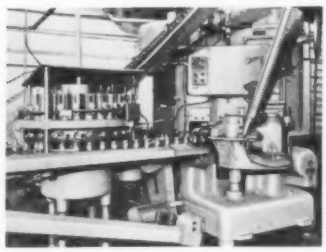
mark, et al. This marking unit and its marking compounds are designed for imprinting on Pliofilm, cellulose acetate, cellophane, hydra-cellulose and similar packaging materials. Maximum imprint size is 2-5/16" by 6-11/16" with type bar or master plate, 2½" by 6½" with rubber plate. Circle No. 3.

Boilable, Transparent Film

Standard Packaging Corporation's Flex-Vac Division announces development of polyester/polyethylene pouches, for such applications as food products that may be boiled by dropping the sealed pouch in water. A special feature of the pouch, according to Standard, is its use of a laminating adhesive that retains its strength from 80 degrees below zero F to well over the boiling point. With this adhesive laminating the polyethylene and polyester films, the resulting bond has held up (in tests) under eight hours of continuous boiling. Circle No. 4.

Can Closing Unit

American Can Co. announces its 210-8R, a new self-contained, can-revolve closing machine for double-seaming round cans. It has eight seaming units in a revolving cage, handling cans from 202 to 212 in diameter and 200 to 508 in height. It may be adapted



for steam flow or gas flow closure, and may be arranged for close hook-up to most fillers, to provide smooth can transfer. Circle No. 5.

Automatic Control Systems

Devco Engineering Inc. reports its development of automatic control systems for such applications as automatic oper-

ation of multiple lock tab carton packaging equipment (seen in accompanying illustration), baling and gluing controls, carton and tray forming controls, as well as feed rate, handling, loading, sequencing, transfer and applicator controls. These units are available for explosion-proof operation, dust-tight, water-tight or drip-proof functioning, as well as regular commercial use. Circle No. 6.

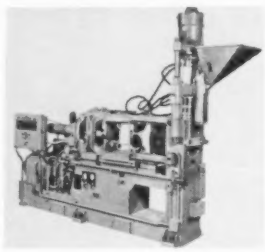
New Polyethylene Resin

E. I. du Pont de Nemours & Co. an-

nounces its "Alathon" 34 polyethylene resin, designed for film applications requiring increased clarity, stiffness, sparkle and high impermeability. Attributing these properties to the high level of crystallinity of the new resin, Du Pont researchers predict that it will be especially useful for soft goods packaging. Also, they say these properties will enhance its value as a coating for paper, foil and other substrates. Its stiffness and resistance to heat distortion suggests its use for bottles and containers. Circle No. 7.

Injection Molding Machinery

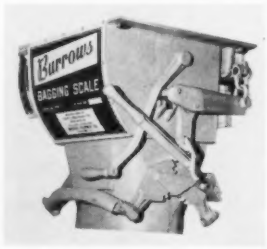
Lester-Phoenix, Inc. says that its new L-2-4-oz. unit has an ejector pattern in the movable die plate designed to meet



SPI standards, and has an adjustable mold opening — which allows a molder to control the stroke from six to nine inches by turning a crank at the end of the link cylinder. Adjustment of stroke length takes about two minutes' set-up time and saves seconds on each cycle, according to Lester-Phoenix. Circle No. 8.

Bagging Scale

Burrows Equipment Co. announces its Model 700 bagging scale, a new unit that attaches to a feed mixer or hopper, and that handles six to eight bags a minute. Special feature of the scale is a new capacity type weighbeam built into the back of the scale, eliminating loose weights. Made of aluminum and steel castings, the scale weighs 95 pounds. A manually-operated bag clamp has a rubber-covered gripping bar to support bags of any material. Circle No. 9.



Expendable Paper Pallet

Titan Products Co. says that its new one-ton capacity expendable paper pallet is available in 32" by 40" and

40" by 48" sizes, with both two-way and four-way entry for fork trucks. Delivered knocked-down, the pallet is folded and wire stitched or stapled as needed. According to Titan, the design and principle of the pallet incorporate engineering and manufacturing methods that give it full deck strength. Circle No. 10.

Automatic Bundle Printer

Industrial Marking Equipment Co. announces a marking, dating and coding attachment for automatic bundling machines. The imprinting operation utilizes an aniline dye process with rubber type — inked from a self-contained

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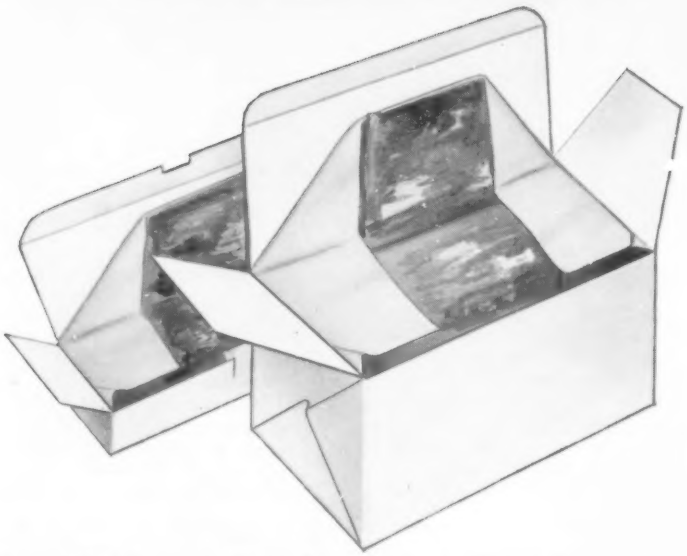
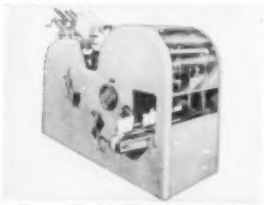


Use Peters Packaging Equipment to line your cartons with foil

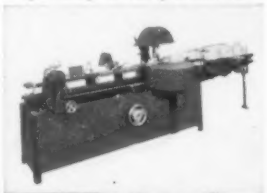
Attractive cartons — with appealing foil liners—are the result of teaming a Peters Model SE Carton Forming and Lining Machine with a Peters Model CCY-L Carton Folding and Closing Machine.

Cartons are automatically formed and lined with paper-backed foil liners. After filling, they are folded and closed. Speeds to meet requirements. Change-over to various size cartons is quick and easy.

Send samples of your packages for complete information and recommendations to meet your requirements.



Peters Model SE automatically forms and lines cartons at speeds up to 120 per minute.



Peters Model CCY-L automatically folds and closes foil-lined cartons at speeds up to 120 per minute.

Peters MACHINERY COMPANY

4702 Ravenswood Avenue, Chicago 40, Illinois

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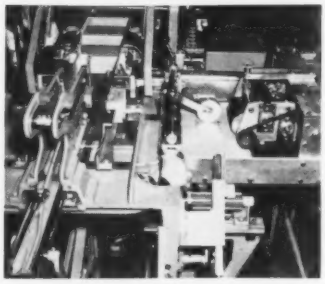
vertical reservoir. Ease of cleaning and ease of changing type are among the features of this equipment. The imprint



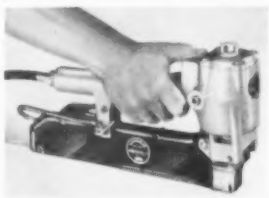
is positioned so that when a bundle is formed the printed material appears on the end of a rectangular package. Circle No. 11.

Multiwall Bag Coating

St. Regis Paper Co. reports development of "Lustergrip", a non-skid coating that provides an even, clean surface. The coating is applied after printing, thus reducing ink rub. In contrast to use of rough surfaces, the principle of non-skid action used here is that two bag surfaces tend to adhere tightly, just as do two pieces of glass, according to St. Regis, who notes that the coating is non-toxic. Circle No. 12.

Automatic Nailing Unit

Spotnails, Inc. announces its Model M pneumatic attachment for its standard mallet-drive "Spotnailer" which permits



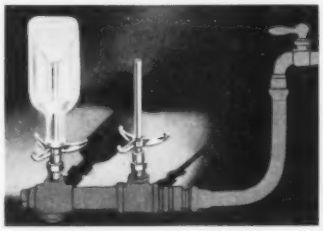
a one-hand operation. It handles heavy gauge staples up to 1-3/16" long. According to Spotnails, the Model M employs a new high velocity principle, explosive in its force, and which operates without bounce or recoil when run at arm's length. Circle No. 13.

Humidity Indicators

Culligan, Inc. says that its new plastic button-type humidity indicator fits into a ⅜" hole cut in a flexible barrier, such as a pouch or bag, and indicates humidity within an accuracy of five per cent. Culligan also announces another new indicator — a metal plug-type for use on rigid metal barriers and AN containers. It has a ¾" pipe thread and is made to fit a standard flange. Both indicators have visible windows and neither requires reactivation. Circle No. 14.

Hand Washing Equipment

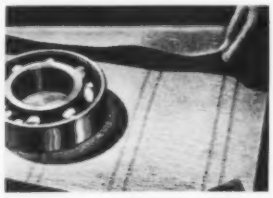
U. S. Bottlers Machinery Co. announces its new automatic rinsing spouts, in two sizes, for washing containers. The nor-



mal water pressure keeps valves closed, but they open automatically as soon as a slight hand pressure and the weight of the inverted container lowers the bottle rest, thus releasing water into the container — for rinsing. Circle No. 15.

Laminated Greaseproof Wrap

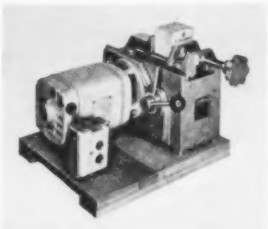
Angier Corp. reports production of a new Mylar-laminated Grade A greaseproof wrap. The polyester film is lami-



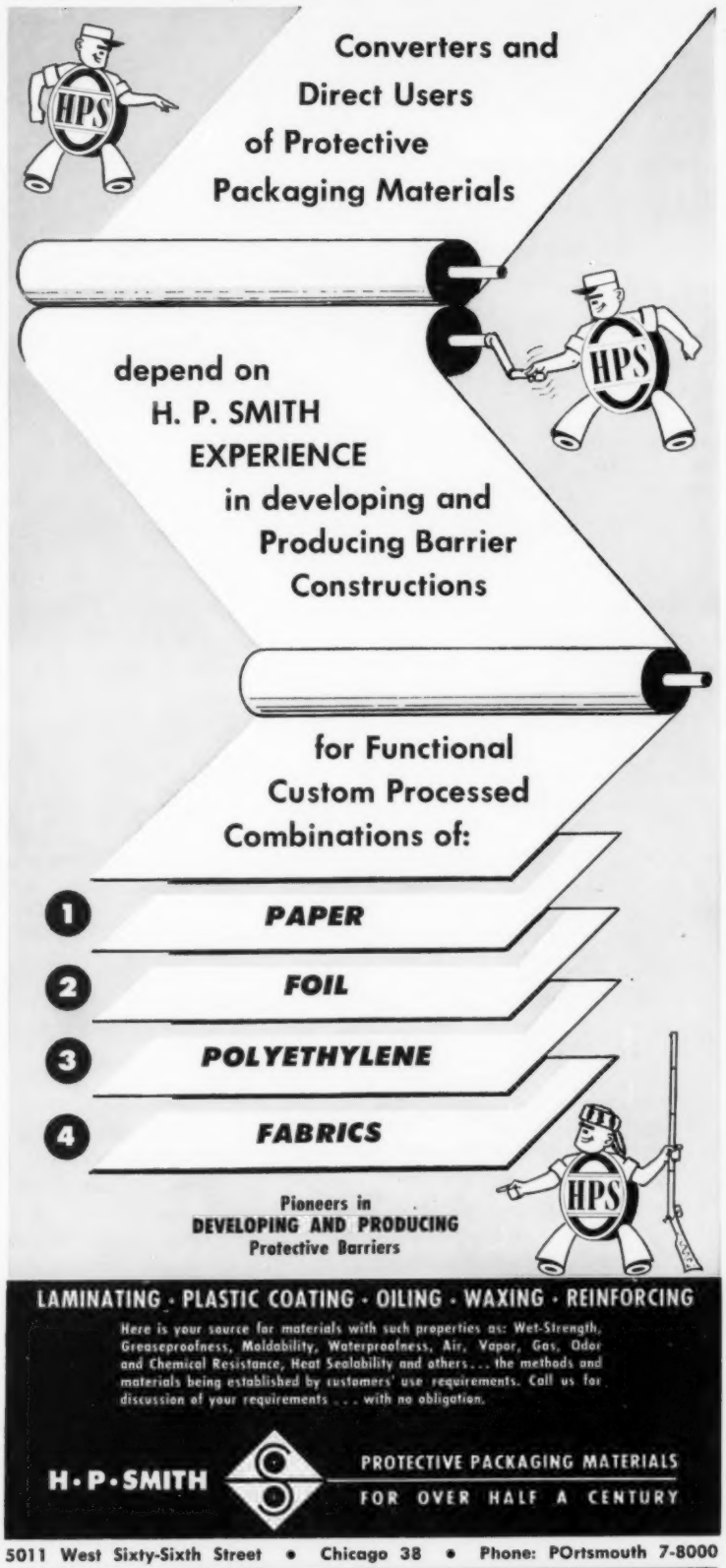
nated with a neutral adhesive to red striped neutral kraft, and is then creped-to-stretch, to provide a moldability for packaging use. This wrap is made for greaseproof packaging of metal parts under JAN-B-121. Circle No. 16.

Dating, Coding Machine

Griffin-Rutgers, Inc. announces its Codedge Mark II label dating and coding machine. This unit codes by means of



cutting a series of notches on the edge of a label, which is read with a code card. It codes not only labels but also packages such as film or foil bags, wrappers and small cartons. The company reports that it codes labels at speeds up to 2,000 a minute. Circle No. 17.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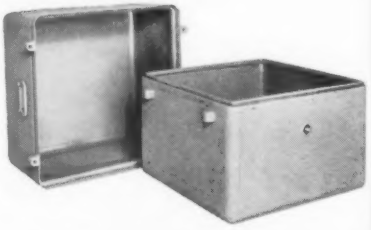
* * *

These RE-USABLE Metal Containers were manufactured by PETERS-DALTON for items ranging from aircraft engines, electronic parts, to large A-N containers in all types and sizes for shipping purposes. Complete engineering and manufacturing facilities are at your disposal for design, testing and fabricating. We'll be glad to tell you more—just write, wire or phone.

Materials formerly used in packaging one light military electronic item.



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Package Material Analysis

Dobeckmun Co. has a set of product analysis reports reviewing specific applications of packaging materials. Each of these reports covers package details, material cost, a description of the packaging operation and the reasons underlying use of the particular packaging combination — for each given product. Circle No. 101.

Plastic Packaging Directory

Koppers Co. announces its 1956 Directory of Plastic Packaging Suppliers, a 90-page pocket size booklet which lists alphabetically (according to city and state) of these suppliers. Each listing contains specific references to the type of packaging and the polystyrene, polystyrene foam, and polyethylene plastic materials furnished by each of the listed suppliers. Circle No. 102.

Heat Resistant Labels

Avery Adhesive Label Corp. offers a laboratory test report on oil and heat resistant pressure-sensitive labels. This sheet not only gives the details of the primary and absolute heat bonds and the effects of exposure on label stock and inks but also includes charts of the bond tests showing the heat and time relationships. Circle No. 103.

Packaging, Mechanics, Details

The KVP Co. reports availability of a 32-page booklet on the creative and mechanical aspects of packaging. Profusely illustrated, it contains explanations of a number of packaging topics, including paper details, categories of flexible packaging, mechanical considerations in planning an overwrap, and other planning and production data. Circle No. 104.

Air Shipping Details

Hinde & Dauch announces a revised edition of its booklet, "How To Ship By Air In Corrugated Boxes", containing 20 pages of details on air services, time comparisons, cargo dimensions and weight limitations, and corrugated boxes for use in making air shipments, including some case histories. Circle No. 105.

Contoured Package Guide

Plastic Artisans, Inc. has an eight-page booklet illustrating and describing the use of contoured dome packaging. Line drawings and specification data supplement the halftones that illustrate typical packages. Explanations cover both custom and standard packages. Circle No. 106.

Aerosol Filling

Mojonnier Associates, Inc. offers a booklet discussing the advantages of features of the cold filling process for aerosol containers. It reviews such points as speed, accuracy and choice of valves and makes use of halftones and line drawings to illustrate equipment and principles of operation. Circle No. 107.

Tension Control Equipment

Web Controls Corp. has a folder describing its automatic tension control, illustrating its use of the Frankel system which operates without follower or dancer rolls. The folder includes performance curves and equipment specifications, as well as pertinent halftones and drawings. Circle No. 108.

Packaging Machinery

Lynch Corp. has a folder reviewing its automatic machinery to print, form, wrap, carton and overwrap butter, margarine and other products. Halftones of machinery as well as line drawings accompany the descriptive data and machine specifications. Circle No. 109.

Aerosol Packaging

Continental Filling Corp. offers an illustrated booklet showing step by step its sequence of plant operations and filling procedures. Halftones and detailed captions explain each of the operations. Circle No. 110.

Dry Label Details

Nashua Corp. announces its booklet on "Label Impact" which discusses adhesive control, production efficiency and dry labeling versus heat seal labeling. Other information relates to purchasing and management aspects of label problems and usage. Circle No. 111.

Bag Making Equipment

Conapac Corp. has a descriptive sheet reviewing the features of its "Poly-ette" equipment for making polyethylene bags from flat and gussetted tubing. Specifications and operating details as well as machine advantages are enumerated. Circle No. 112.

Gravity Fillers

W. F. & John Barnes Co. offers a bulletin describing the features of the Libra-scope gravity fillers, including construction details and operating specifications. Illustrations accompany the explanation. Circle No. 113.

Tube Filling Machinery

Arenco Machine Co. Inc. has a folder that not only describes its Swedish-made tube filling machine but also reviews types of tube closures as well as operational and in-plant details. Illustrations and machine specifications are included. Circle No. 114.

Cartoning Equipment

Container Equipment Corp. offers a folder describing its Model 40 adjustable cartoner. Halftones of the equip-

←For more information circle No. 216 on Reader Service Card

ment and line drawings of floor plan usage and carton details accompany the enumeration of machine features and functions. Circle No. 115.

Tying Machinery

B. H. Bunn Co. has an eight-page illustrated folder on its package tying machine. This folder not only explains (with illustrations) how the equipment operates but also has drawings of a wide range of tying applications and types of wraps used with the machine. Circle No. 116.

Humidifying Equipment

Walton Laboratories Inc. offers a 14-page booklet explaining its controlled humidification systems and reviews details of application and use in connection with packaging, graphic arts, and paper production and handling. Illustrations of plant installations accompany the text. Circle No. 117.

Forming, Wrapping Machines

Package Machinery Co. offers a folder reviewing the Forgrove candy-making and wrapping machinery. Illustrations include halftones of close-up photos and line drawings showing key points of machine operation. Design features are reviewed. Circle No. 118.

Impact Measurement

The Impact-O-Graph Corp. offers a bulletin on its equipment for three-directional recording of impact, such as for the evaluation of cushioning and packaging materials. The folder illustrates the different models and explains their applications. Circle No. 119.

Packaging Line Equipment

J. L. Ferguson Co. has a folder describing its automatic packaging line equipment, including a single tier case loader, multiple tier case loader, as well as case opening and positioning, and sealing equipment. Line drawings accompany the halftones illustrating the folder. Circle No. 120.

Round Container Labeling

Paisley Products Inc. offers Technical Service Bulletin No. 16 which discusses round container labeling. The folder reviews machine functioning as well as adhesive aspects of the labeling operations. Illustrations show operating details and labeled containers. Circle No. 121.

Multi-Process Presses

New Era Manufacturing Co. has a booklet describing the specifications and features of its multi-process printing presses and which details the sequences of operations which this equipment can handle. Illustrations accompany the text. Circle No. 122.

Tableting Equipment

Arthur Colton Co. offers a 24-page catalog of its pharmaceutical and tableting equipment. A description of structural and functional features of each machine, as well as specifications, and halftones of the equipment, appear in the catalog. Circle No. 123.

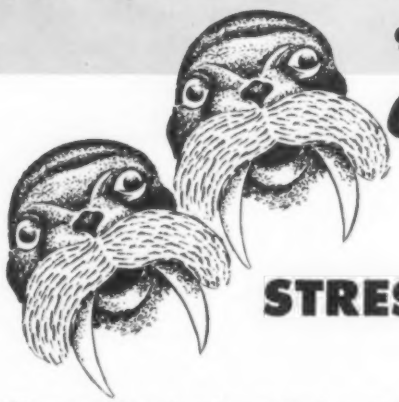
Can Machinery

E. W. Bliss Co. announces Section 3 of Catalog 36B, a 16-page booklet reviewing the company's line of can body makers, power formers and duplex seaming presses for medium and high speed can lines. Halftones supplement the enumeration of design and construction features. Circle No. 124.

Case Packing Equipment

Burt Machine Co. offers a four-page folder illustrating and describing its

Maybe these water-resistant, tough, reinforced gummed tapes can



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high-speed case packers. It also explains the system of can supply used with this equipment, and enumerates the basic specifications and details. Circle No. 125.

Bottle, Can Packers

Standard-Knapp Div. of Emhart Mfg. Co. has an eight-page folder reviewing the structural and functional features of its 830 series of packing machinery. Line drawings as well as halftones of close-up photos augment the explanations in the folder. Circle No. 126.

Label Equipment

Oliver Machinery Co. has a folder describing its 806 label imprinter and cut-stacker. Facsimile label reproductions accompany the halftones and line drawings that illustrate the explanatory text. Machine specifications also are included. Circle No. 127.

Lettuce Wrapper

Wrap-King Corp. offers a circular describing its Model L automatic lettuce-wrapping machine that utilizes a full view conforming wrap. Illustrations and machine details and specifications accompany the text. Circle No. 128.

Vacuum Cap Sealer

Anchor Hocking Glass Corp. has a folder describing its "Steriseal" machine and reviewing special features such as its gradual displacement headspacer, automatic cap feed, and sealing belt. Circle No. 129.

Carton, Tray Machinery

Peters Machinery Co. offers a descriptive sheet reviewing the operation and details of its Model SG carton and tray forming and gluing machine. There is a listing of basic machine specifications. Circle No. 130.

Package Casing Machine

Food Machinery and Chemical Corp. has a bulletin on its "Sure-Way" package caser. Not only are machine features reviewed but also illustrations of typical user installations accompany the descriptive text. Operating details and machine specifications are included. Circle No. 131.

Container Seam Closure

Kieckhefer Container Co. has folder describing its "Quad-Lok" seam closure, as well as its "Pul-Tab" opening feature. Illustrations show typical cases using these features, including close-ups of the opening feature. Circle No. 132.

Neck Band Machinery

Gisholt Machine Co. offers a bulletin reviewing its "Sealamatic" automatic neck band applying machine. A sequence of close-up illustrations reveal the step-by-step operation of the equipment. The bulletin also explains accessory items and lists features and specifications of the machine. Circle No. 133.

Carton Set-Up Units

E. L. Bivans, Inc. has a bulletin describing its "Tuck-o-mat" and "Convey-o-mat" equipment for setting up tuck-end cartons. Machine specifications, descriptions and listing of carton sizes handled accompany the illustrations and text. Circle No. 134.

Labeling Machinery

Economic Machinery Co. offers Bulletin BL 100 describing its "Bee-Line" labelers. Close-up illustrations show equipment functioning and line drawings show floor plan installations. Machinery specifications also are included. Circle No. 135.

Re-usable Containers

Peters-Dalton Inc. offers its Technical Bulletin No. 601 which describes features of its re-usable containers and special products, including illustrations and drawings of containers and their applications. Circle No. 136.

QM research explores new concepts

(Continued from Page 15)

under 20 cents per net pound. Use of extraction parachutes and paper honeycombs are destined to replace huge cargo parachutes, and will deliver combat rations and 55-gallon drums within a predictable trajectory.

Need Industry Help

Col. John D. Peterman, commandant of the Institute, pointed out the dependence of the government on help from industry, and stressed the importance of the work of the Research and Development Associates, a group consisting of more than 200 companies and nearly 300 academic and institutional representatives concerned with food or container problems.

"They give us the industrial point of view, the know-how and know-why that the government could not possibly supply without millions of dollars worth of equipment and talent to do the job," Colonel Peterman said. "They are a resource for drawing upon all industry (not merely their own membership) for counsel and assistance," he added, noting that the Associates provide a means of getting expert assistance quickly.

Pointing out that the Quartermaster has assigned the Institute responsibility for the packing and packaging of all Quartermaster supplies except fuels and lubricants, Dr. D. K. Tressler, the Institute's scientific director, emphasized the importance not only of the advisory committees, but also of the research and development contracts, 76 of which involve an expenditure of a million dollars, and twelve of which are "no cost" or gratis contracts with food packers and container manufacturers who do research and development work of interest to the government without reimbursement.

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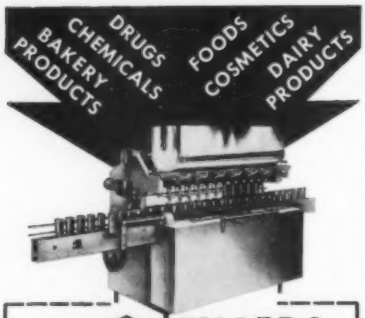

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Circle No. 219 on card

Michigan State packaging students seek summer jobs

Nearly 70 of the 100 students enrolled in the four-year packaging degree program at Michigan State University, East Lansing, are now seeking temporary employment in the packaging field. Package users, as well as container manufacturers and converters of packaging materials, may contact the university's placement bureau regarding their job requirements and openings.

During past summers these packaging students have taken jobs as vacation replacements in production, quality control, sample making, and design and testing. Most of the students are qualified to make routine tests on paper, board, film, foil — as well as nearly all kinds of containers. Some have successfully filled positions as temporary project engineers on short duration projects. Many of them aspire to technical service positions, including sales.

The university suggests that temporary employment of these young men is an excellent means of locating and determining the possibilities of prospective appointees to permanent positions. Inquiries should go to:
Placement Bureau,
Michigan State University,
East Lansing, Michigan

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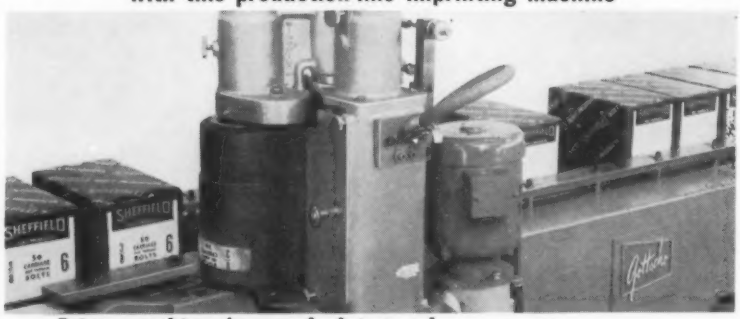

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Circulation this issue in excess of 35,000

HELP WANTED

MATERIALS HANDLING — PACKAGING ENGINEER—Our Central Engineering Staff requires an engineer with experience in packaging and materials handling. A man with 3-6 years of experience, preferably with a chemical company, to study problems in our various plants can create a permanent need for such a program. The right man can work himself into a key man production responsibility. Write stating education, experience, qualifications, salary expected giving complete details in first letter. All communications will be answered and will be held in strict confidence. Address: THE BORDEN COMPANY, Chemical Division, Bainbridge, N.Y. Attention: D. R. Long.

SALES REPRESENTATIVES — MANUFACTURERS' AGENTS—Several choice territories open on flexible packaging with AAA-1 Plastic Company — see announcement page 3. Openings also for Sales Promotion Assistant and sales correspondents. Address: Amos Packaging Division, Amos-Thompson Corporation, Edinburg, Indiana.

MAN WANTED—Person to bring sales services with trade, or paper specialty to be manufactured, jobbed or converted on

mutual profit arrangement. Address: Box 501, PACKAGE ENGINEERING, 1791 W. Howard St., Chicago 26, Illinois.

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PACKAGING SUPERVISOR—Complete charge of production and maintenance. Presently employed. Will relocate. Package machinery experience. Also have had related experience in all personnel work, such as setting up training programs, recruiting help, safety, industrial relations, etc. Can give any previous employer as reference. Address Box 502, PACKAGE ENGINEERING, 1791 W. Howard St., Chicago 26, Illinois.

FOR SALE

FOR SALE—Packaging machine, Battle Creek Model B T 30 and Bond M L dual filler. Fills, seals folding boxes, both bottom and top. Operates on the continuous flow principal. Quickly convertible for handling a wide range of boxes, sizes up to 10 inches in height, 30-40 per minute. Price of a new machine $15,120.00; this used one $5,000.00. Address: W. J. Wittekind Company, 1041 Richmond Street, Cincinnati 3, Ohio, Attention: W. J. Wittekind.

PATENTS FOR SALE—New insect trap quickly eliminates roaches, every size and variety, and other household pests. No poison, odor or unsightlyness. Needed by millions in homes and buildings. Can do no damage to children, pets, food or health as insecticides do. Patents for sale or lease. Sample $5. postpaid. Address: Dr. E. N. McGrew, 1932 Midland, Fort Smith, Arkansas.

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• Cartons of bottles, jars, cans or containers are inverted on to the tilt top table and their contents pushed onto the revolving disc. Units are *automatically regimented and despatched in single file* to the conveyor.

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What we think

Lately, we have been taking a close look at the Quartermaster Food and Container Institute for the Armed Forces, a unit of the Quartermaster Research and Development Command, whose responsibilities include meeting the food and packaging needs of the services. It is doing an outstanding job in applying concentrated research to the challenging problems of rapidly-changing military requirements.

An article in this issue of PACKAGE ENGINEERING highlights three major projects of the Institute—radiation preservation of food, dehydration, and aerial delivery. The main idea behind these projects is very simple: Any future military operations are bound to entail relatively small dispersions of combat troops over wide areas, and subject to rapid movement. These men will require the right kind of food, in packages easy to carry and preserve—and susceptible to aerial delivery. Incidentally, aerial delivery seems to be one of the most important concepts of today's military thinking. It deserves much study—especially by packaging experts in general.

How the Institute goes about the research incidental to the major and minor problems of the overall military picture is significant. It uses a three-way partnership of military, scientific and technical, and industrial and commercial thinking. Primarily, the military viewpoint is paramount—because everything done must meet the exigencies of combat. Secondarily, to provide continuity of scientific and technical service, the Institute has a fulltime staff of civilian scientists, technologists, and engineers.

The third aspect of the trio is the use of industrial and commercial research and development talent and facilities. This includes not only the companies with whom the government has research and development contracts, but also a number of industry advisory committees working on specific problems. Spearheading the relationship between the Institute and industry are the Research and Development Associates.

They include more than 200 companies and nearly 300 academic and institutional representatives—all concerned with food or container problems. The officers and directors of the Associates are top executives and key technical men in package supplier and user companies. A focal figure in the functioning of the group is its secretary, Col. Rohland A. Isker, USA ret. A career army man, he was wartime commanding officer of the QM Subsistence and Development Laboratory, predecessor of the Institute.

Colonel Isker's office provides two-way contact between industry and the Institute. Companies having special problems or needing help in their contacts with the military agencies find his assistance valuable. Likewise, the Institute uses his office as a clearing house or expediter when seeking specific industry assistance. Incidentally, when the Institute appeals to the Associates for help, the search for assistance is not confined to merely the membership of the Associates.

We think more companies interested in all these food and packaging problems should join the Associates. Its activities not only offer opportunities for invaluable public service through food and packaging research and development, but also they pay substantial dividends to participants—dividends such as being kept abreast of important technological developments affecting civilian as well as military packaging, such as radiation preservation.

Those not acquainted with "the management" of Quartermaster Research and Development, as well as the Institute, are in for a pleasant and stimulating experience. They will find high-ranking, heavily-ribboned officers (with plenty of combat experience) who have a surprisingly keen grasp of business affairs, a grasp far more typical of career officers than most people realize. They will find an alert team of dedicated scientists and technicians, whose research is doing much to reduce to measurable terms a great deal about which little is known.

Whether the problem is packaging soap (a tough one, because of a need for a liner that will permit normal evaporation of moisture in the soap without releasing the moisture into the board of the container itself) or coming up with a new cushioning material for airdrop, the three-way combination of military, scientific and industrial research is finding the answers.

Now is the best time to solve military food and packaging problems. If the need for active military operations ever should arise, there will be no time for extended research. If the need never arises, the time and effort may be considered well spent. And in either case, industry gets the benefit of the Institute's research.

Bruce Holmgren

Editor

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VISQUEEN

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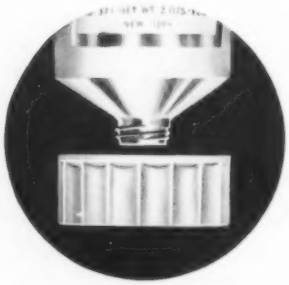

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